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Childhood Pneumonia in Nuwakot District, Nepal: Perceptions, Management, and the Impact of a Community Intervention

Amy B. Levin

YALE UNIVERSITY

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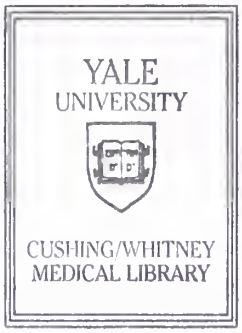
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Childhood Pneumonia in Nuwakot District, Nepal: Perceptions, Management, and the Impact of a Community Intervention

A Thesis Submitted to the
Yale University School of Medicine
in Partial Fulfillment of the Requirements for the
Degree of Doctor of Medicine

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CHILHOOD PNEUMONIA IN NUWAKOT DISTRICT NEPAL: PERCEPTIONS, MANAGEMENT, AND THE IMPACT OF A COMMUNITY INTERVENTION.

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Acute Respiratory Infection (ARI) is one of the major causes of preventable death among children in the developing world. Pneumonia accounts for the majority of these deaths. This two-part study was undertaken in the remote district of Nuwakot, Nepal to assess the management of pneumonia in children under 2 years of age. The baseline work was intended to provide a snapshot of the treatment of pneumonia in this population through the characterization of local health providers' and mothers' perceptions and practices. The findings were used to guide the design of a community-based intervention for Save the Children. In the second portion of the study, a follow-up evaluation of the pilot program was conducted. The tools for both studies included interviews, observations, record review and focus groups.

Results of the baseline study demonstrate that the local government health infrastructure does not adequately provide care for respiratory infections. Health Post Workers lack pneumonia-specific knowledge; only 50% could site tachypnea and chest retractions as the 2 most important signs for diagnosing pneumonia. Health posts are understocked, often without the first-line antibiotic of choice to treat pneumonia. Mothers are uninformed about pneumonia signs and symptoms. They delay in seeking care at health posts, waiting an average of 3.7 days from symptom onset. Over 55% of mothers rely on traditional medicine, which contributes to this delay in care-seeking. The follow-up evaluation revealed that pneumonia training may improve knowledge and practices of Community Health Volunteers. However, the impact of the program appears limited due to lack of community participation. Implications of the study findings are discussed in the context of global ARI strategies.

Acknowledgements

This work could not have been carried out successfully without the help of many dedicated individuals both in New Haven and Nepal. First, thank you to my thesis advisor at Yale, Dr. Michael Cappello, for helping to shape this project from the start and for guiding me throughout my years at Yale. I am also grateful to Dr. Robert Baltimore for sharing his expertise in international pediatric infectious diseases. Thank you to my Nepal supervisors, Chanda Rai and Naramaya Limbu, the Save the Children health staff both in Kathmandu and Nuwakot—particularly Bharat Panta and Roma Raut, and to the Health Post Staff and the Community Health Volunteers who are the backbone of care for children in Nuwakot. I was fortunate to receive funding from the Wilbur Downs International Health Fellowship and the Yale School of Medicine Office of Student Research. Finally, thank you to my husband, Jon, who has supported me along every step of this journey.

Overview of the Thesis

I. The first chapter begins with an overview of ARI terminology, etiology, burden of disease and public health strategies. It then focuses specifically on current knowledge regarding respiratory infections in Nepal and provides background information on the local socio-economic conditions and health infrastructure. It closes with a description of Save the Children's activities in Nuwakot.

II. The second chapter describes the aim of the work and the methodology of the baseline study including sampling and statistical analysis.

III. The third chapter presents the results of the baseline study followed by a discussion of the findings.

IV. The final chapter outlines the structure of the pilot program, follow-up study methodology, results and a discussion of those findings. It concludes with recommendations for future approaches to pneumonia management.

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List of Acronyms

ARI	Acute Respiratory Infection
CHV	Community Health Volunteer
EPI	Expanded Program on Immunizations
HP	Health Post
HPW	Health Post Worker
MCH	Maternal Child Health
MOH	Ministry of Health
NGO	Non-Governmental Organization
SHP	Sub-Health Post
TH	Traditional Healer
USAID	United States Agency for International Development
VDC	Village Development Committee
VHW	Village Health Worker
WHO	World Health Organization

I. Introduction

ARI—An Overview

Acute Respiratory Infection is one of the major causes of preventable death among children in the developing world, accounting for roughly 30% of the 14 million annual fatalities of children under 5 years of age [1-4]. Pneumonia leads to 3 million of these deaths each year [1-3, 5]. ARI-associated mortality is more than 30 times that in more developed countries, leading researchers to draw a link between pneumonia mortality and the immuno-suppressed state of children in the developing world [4,5]. This vulnerable state is attributed largely to diarrheal disease and/or chronic malnutrition [2-6]. Studies also indicate that ARI incidence is inversely related to age, peaking in the first 18 months of life [2-3,7-8].[1]

Traditionally, ARI is classified into 3 subgroups: upper, middle, and lower infections. Upper and middle infections include the common cold, acute otitis media, pharyngitis/tonsillitis, tracheobronchitis, and acute epiglottitis. While upper tract infections are frequently self-limited, they can progress to serious illnesses and are often found in conjunction with lower respiratory tract infections. Pneumonia and bronchiolitis are the most clinically significant lower respiratory tract illnesses and account for the majority of ARI fatalities. Studies in both developed and developing countries indicate that RSV and parainfluenza viruses are the agents most commonly associated with bronchiolitis. Pneumonia

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[1]The pneumonia trial conducted in Jumla, Nepal between 1986 and 1989 found that roughly 65 % of pneumonia episodes treated in children under 5 occurred in infants under 1 [7]; The 1995 Nepal Multiple Indicator Surveillance reported that ARI is most prevalent at 2 months of age.

has been linked to the bacterial pathogens *Haemophilus influenzae* and *Streptococcus pneumoniae* with some cases caused by *Staphlococcus aureus* [2-5]. The agents most frequently associated with viral pneumonia include RSV, parainfluenza, influenza, and adenoviruses. Because of the technical complexity of acquiring accurate microbiologic data, the percentage of pneumonia cases caused by bacteria in the developing world has been difficult to determine. However, bacterial pathogens are thought to be significant, accounting for approximately 60% of cases [2-5, 9-10].

Due to the many viral and bacterial pathogens involved and the wide spectrum of respiratory illness, the implementation of realistic intervention strategies for ARI management in the developing world has been challenging. While polysaccharide conjugate vaccines against *H. influenzae* type b (Hib) have been available to children in developed countries—largely eliminating diseases caused by this organism—they are not used in developing countries due, in part, to expense [5]. Existing pneumococcal vaccines have not been shown to induce protective immunity in children under 2 years of age. Several field trials of *S. pneumoniae* conjugate vaccine are planned and would likely have a large impact in reducing mortality in developing countries [5, 11]. In the absence of readily available and effective vaccines, most public health measures aimed at managing ARI rely heavily on the use of the primary care systems within these countries. The World Health Organization's 1981 memorandum on the clinical management of ARI in children continues to reflect the current global ARI strategy:

> To reduce the massive mortality of acute respiratory infections which now occur in children under five years of age in developing countries, the improvement and upgrading of clinical management, particularly by primary health workers, seems to be the strategy of choice [1].

The organization also stresses that "the main objective of the WHO program on acute respiratory infections is the development, through epidemiological and operational research, of standard plans of patient management that can be applied at the primary health care level" [12].

The WHO protocol for ARI management offers guidelines for assessment and classification of pneumonia, treatment and referral, and advice for mothers about home care. The protocol depends on 2 critical decisions—whether to treat the child with antibiotics and whether to refer to a hosptial. These decisions rest primarily on the assessment of tachypnea and chest retractions. The algorithm definitions are highlighted below in Figure 1, and presented in greater detail with treatment recommendations in Appendix 2 [13].

Figure 1: WHO ARI Diagnosis Algorithm Definitions

FAST BREATHING
Infants < 2 months: respiratory rate (RR) > 60 breaths/minute
Infants 2 months - 12 months: RR > 50 breaths/minute
Children 1 - 5 years: RR > 40 breaths/minute

PNEUMONIA CLASSIFICATION		
	INFANT < 2 Months	CHILD 2 months - 5 years
SEVERE PNEUMONIA	Fast Breathing or Severe Chest Retractions	Chest Retractions
PNEUMONIA	NA	Fast Breathing No Chest Retractions
NO PNEUMONIA	No Fast Breathing No Chest Retractions	No Fast Breathing No Chest Retractions

ARI Terminology

Because pneumonia causes the great majority of ARI fatalities, it is deservedly the main focus of the WHO and Nepalese ARI programs. Unfortunately, there is widespread confusion among health workers about ARI terminology, with "ARI" often used to denote pneumonia. Some authors attempt to avoid this confusion by distinguishing pneumonia as ALRI—Acute Lower Respiratory Infection. While it is difficult to isolate upper tract infections from pneumonia due to clinical overlap, it is important to be clear about terminology. The primary focus of this study is pneumonia, and it will be referred to specifically as such throughout this paper. ARI will be used to refer to the broader class of respiratory infections.

ARI in Nepal

There is little reliable information on pneumonia morbidity and mortality in Nepal. Inadequate or nonexistent record-keeping at the Health Post level, as well as under-utilization of government health services, present one obstacle to accurate estimation; while the inherent difficulties of identifying ARI through retrospective questionnaires has hindered other attempts. The Department of Health Services initiated a new information-gathering system—their first report, for 1994-1995, contains district-specific ARI data gathered from Health Post records—and hopefully this will eventually generate accurate incidence numbers for pneumonia and other diseases. The Ministry of Health currently estimates that roughly 30,000 to 40,000 children under five die as a result of ARI complications each year. Using the current under 5 mortality rate of 118/1000 for Nepal, this translates to approximately 40% of fatalities in Nepalese children under 5 years of age [Nepal Ministry of Health. 1996. *Nepal Family Health Survey.* Preliminary Report].

The best available measurements of pneumonia incidence in Nepal come from 2 intervention trials in Jumla and Dang. From 1986 to 1989, researchers in Jumla supervised community distribution of antibiotics and collected vital events data for a population of 13, 404 children under 5. They reported treatment rates for pneumonia to be 870 per 1000 children per year in children under 5 and 1600 per 1000 children per year in children under 1 year of age [Houston, R. 1991.

Supplemental Analysis of the Dang ARI Project Census and Questionnaire Data].[2] Due to the low socioeconomic status of this region, these rates are potentially higher than for most other areas in Nepal, although it should be noted that the 1995 Nepal Multiple Indicator Survey report found pneumonia incidence to be lowest in the Midwest [Nepal Ministry of Health. 1996. *Nepal Family Health Survey.* Preliminary Report].[3] The Red Cross-led intervention in Dang has also constructed some rough incidence numbers using 1990 census data and an ARI questionnaire administered to 1839 children under 5 deemed sick in the last month. They calculate pneumonia incidence at 705 cases per 1000 children per year in children under 3 months and 598 cases per 1000 children per year for children under 5 years of age [Houston, R. 1991.*Supplemental Analysis of the Dang ARI Project Census and Questionnaire Data*].

Despite the lack of hard numbers, it is readily apparent from global approximations and first-hand encounters that pneumonia is a major cause of morbidity and mortality in Nepal. Clearly, efforts to improve pneumonia management are sorely needed.

The Nepal ARI Control Program

In 1986/87, the Nepal Ministry of Health (MOH) Division of Child Health initiated a National ARI Control Program. Despite the name, the program is very decentralized; as of August 1996, there were only 3 staff in Kathmandu at the

[2]These numbers should be viewed only as an approximation of incidence for the dual reason that some cases may not have been observed while others may been treated despite no disease. They do, however, provide a comparative treatment rate for other pneumonia management programs.

national level. Each year, this department of the MOH selects 10 districts and conducts a training for the district level health staff in these areas. The district health staff are then responsible for training community level workers to diagnose and treat pneumonia. John Snow Incorporated, and American consultancy, has designed the training curriculum based on the WHO guidelines [Appendix 2]. At the national level, the Division of Child Health allocates a budget to each district for the purchase of cotrimoxazole [Bactrim] pediatric tablets. In addition, the program produces radio jingles and posters to educate caretakers about supportive home therapy and recognition of danger signs which require prompt medical treatment. At the time of the baseline study, this program was active in 60 of 75 Nepali districts. The program reached Nuwakot in 1995/1996.

Nepal Demographics

Nepal is listed among the 20 least developed countries in the world [14]. It has an infant mortality rate of 107 deaths per 1,000 live births [14]. The mortality rate for children under 5 is 118/1,000 births [14]. More than 40% of the population is malnourished. Literacy, defined as the ability to read and write at age 15 and older is at 27% (40% male/ 14% female) [15]. The industry of the country is 93% subsistence agriculture. The population is 90% Hindu, 5% Buddhist, and 3% Muslim. The country is comprised of 35 ethnic groups with 33 languages, although Nepali is the unifying language. The majority of the

---

[3]Since attempting to identify untreated pneumonia through a retrospective questionnaire is

population inhabits the sub-tropical foothills of the Himalayan mountains (elevation 4000 feet). Due to the topography, there is a minimal road system and no rail.

The Nepal Health Infrastructure

As of 1988, there were 879 physicians in Nepal—or one for every 20, 471 people—the majority practicing in cities [15]. There are several levels of health providers below physicians, ranging from Health Post Workers (HPWs) to Village Health Workers (VHWs) to Community Health Volunteers (CHVs). Nepal has adopted the WHO's concept of primary care using local Health Posts with a referral network for central hospitals. The Sub-Health Post is the first contact point, with one in each village development committee (VDC). These facilities provide maternity care and Expanded Program on Immunizations (EPI) outreach but function primarily as referral centers. They are staffed by traditional birth attendants and Community Health Volunteers. Community Health Volunteers function as the primary gatekeepers of care, and often travel from home to home providing educational services. They do not provide medications. The next referral point in the system is the Health Post. There is one Post per "Ilaka" (region). Like Sub-Health Posts, these Posts provide maternity care and EPI and they are equipped to treat basic primary health care needs. Laboratory services are not offered at these Posts. They are staffed by government employed Health Posts Workers who have received up to 3 years of medical training.

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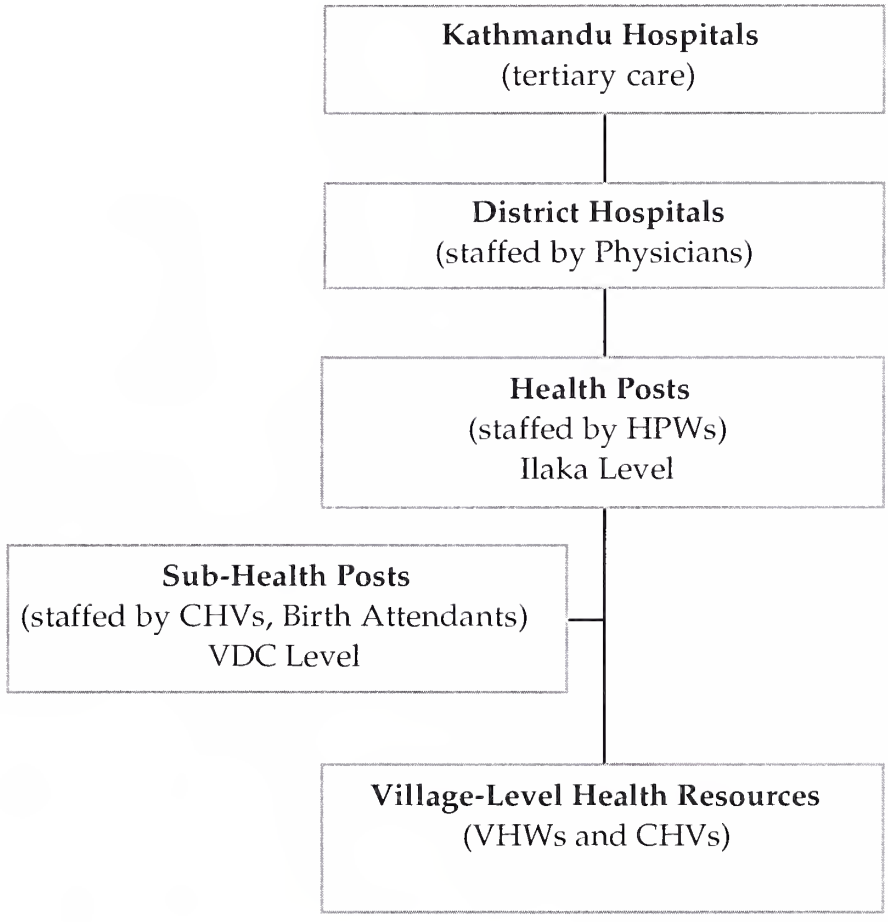
notoriously diificult, it is not entirely clear how to interpret the NMIS data.

Health Posts refer to District Hospitals that provide laboratory, x-ray, and surgical services. These facilities are staffed by 1-3 physicians. See Figure 2 below [16]:

Figure 2: Organizational Structure of Nepalese Health Services



Outside of the government health services, additional providers include private pharmacists, Traditional Healers (Dhamis Jhankris), and non-government organizations such as Save the Children. Pharmacists have come to

play an increasing role in provision of health services. Though not certified to write prescriptions, they often act as the primary care givers.

The Nuwakot Health Infrastructure

Nuwakot is a rural mountainous district comprising 1121 square km. It is a day's bus-ride and several hour walk northwest of Kathmandu at an elevation of approximately 4000 feet. Most homes are accessible only by foot trail, and have no electricity or running water. Save the Children operates in 3 out of the district's 13 Ilakas. These 3 Ilakas contain 42, 405 people with 2,312 children under 2 years of age. The working area population is served by 4 Health Posts, 6 Sub-Health Posts, and 2 pharmacies. These facilities are staffed by 15 Health Post Workers, 12 Village Health Workers, and 2 pharmacists. The district hospital is in Trishuli which is between a 5 hour and 1 day walk from areas within Nuwakot.

Save the Children has been working in Nuwakot since 1992. It provides assistance in maternal/child health care, agriculture and education. In 1995 the organization began implementing Child Survival Project XI under a 4 year grant from USAID. A primary objective of the project is to train health workers to better diagnose and treat ARI and to promote behavior in the community known to reduce ARI risk factors (continued breast feeding, proper nutrition, immunization, treatment seeking and compliance). A central component of Save the Children's activities are "Mobile Clinics" that are held in 33 sites on either a monthly or bi-monthly basis. These are conducted by 2-3 Save the Children health staff. The clinic provides health services to all children under 5 as well as

ante/post natal check-ups. For treatment of pneumonia, a variety of drugs are available at clinic, including cotrimoxazole suspension, amoxicillin, and ampicillin. Save the Children has organized local maternal/child health (MCH) management committees that assist at the clinics, primarily managing the service fees.

There are 126 CHVs in the 3 Ilakas and Save the Children has recorded 47 Traditional Healers, although it is estimated that the number of practicing Traditional Healers is actually higher. CHVs receive a standard 24 day government training, which includes information about pneumonia recognition, supportive and preventive care. Roughly 88 % of CHVs interviewed have also received at least one additional ARI specific training from government staff and/or Save the Children. At the time of the baseline study, they had not been trained in the use of antibiotics. Traditional Healers have become increasingly incorporated into the health infrastructure. Save the Children trained 46 out of 47 identified Traditional Healers in ARI recognition and referral practices. Some Traditional Healers also serve on MCH management committees.

II. Baseline Study

Statement of Purpose

The baseline study was driven by the following hypothesis:

- Community health workers in Nuwakot currently lack the resources to effectively diagnose and treat pneumonia in children under 2 years of age.

Treatment remains sub-optimal because of multiple factors, which may include inadequate training of personnel, poor transmission of key diagnostic and therapeutic information to mothers, as well as insufficient Health Post/Sub-Health Post stock and equipment.

- Treatment inadequacy may also be attributed to the inability of mothers who have accessed pneumonia care to seek further treatment or to comply with treatment due to inconvenience, economic factors, dissatisfaction with curative services, or dissatisfaction/mistrust of "non-traditional" medicine.

The baseline study aimed to characterize the knowledge, attitudes, and practices of Health Post Workers, Village Health Workers, Community Health Workers, and pharmacists in Nuwakot regarding the diagnosis and treatment of pneumonia in children under 2 years of age and to examine the knowledge, attitudes, and practices of mothers in the community about pneumonia treatment seeking behavior and treatment compliance. The larger goal of the work was to improve the quality of medical care provided to children with respiratory infections.

Methods

Data Accrual

The baseline study was designed by A. Levin and was conducted in Ilakas 1, 12, and 13 of the Nuwakot district for a 5 week period from June 15 through

July 18, 1996. Data was collected using 3 different questionnaires, case management observation, focus groups, and record review—a modified version of the 1994 WHO Health Facility Survey Manual [14] and the Johns Hopkins PVO Child Survival Support Program Toolbox [Weiss, B. 1996. *Pneumonia Care Assessment Tool Box*. Preliminary Report]. The study was approved by the Yale Human Investigations Committee.

The Surveys

The surveys were translated from English to Nepali by Save the Children staff in Kathmandu [Appendix 3]. In Nuwakot, the surveys were administered by 4 Save the Children health staff in each Ilaka. The surveys were voluntary, anonymous, and administered verbally after obtaining verbal consent. Participants were told that the goal of the study was to learn more about respiratory diseases in children so as to improve medical management in the community. There were no material inducements for participation. All interviewers received a 2 day training led by A. Levin on standard WHO ARI classifications, diagnostic and treatments protocols, and interview techniques. All interviewers were assisted and monitored in the field by A. Levin.

- Survey 1: given to mothers of children under 2 years of age who self-reported that they had accessed health care for their child with pneumonia in the last 6 months. This survey consists of 22 questions and examines treatment seeking patterns, home care practices, ARI knowledge, and attitudes toward the health care system. Surveys were administered at the

time of Mobile Clinic, during maternal and child health (MCH) clinic, and door to door. Sample Size 105. Please refer to Table 1.

- Survey 2: administered to 3 main groups of health providers in the project site—Health Post Staff, Village Health Workers, and Community Health Volunteers—to gain information about their pneumonia knowledge, attitudes, and practices. The survey consists of 21 questions. The majority of CHVs were interviewed at Save the Children training sessions on diarrheal disease. Sample Size 100. See Table 1.

- Survey 3: given to Traditional Healers to learn more about their pneumonia knowledge and referral practices. The survey contains 13 questions. Interviews were conducted in the homes of Traditional Healers or at Mobile Clinics. Sample size 10. See Table 1.

Case Management Observation

During the 7 week period of the study, observation was undertaken at 8 Mobile Clinics, 4 Health Posts, several Sub-Health Posts, 2 pharmacies, and dozens of villages. While this did not involve systematic data collection, it helped to provide a better sense of the current state of pneumonia management in the working area[4].

[4] The study was initially designed to use the WHO 1994 Health Facility Case Observation survey to monitor Health Poststaff when they were examining a child under 2 with suspected pneumonia. This proved difficult due to lack of cases during the off-season and language barriers.

Focus Groups

Focus groups of 6-10 mothers with children under 2 years of age of the same ethnicity were conducted to gain a better understanding of pneumonia terminology, particularly among the minority Tamang population. In Ilaka 13, a Tamang group was conducted and in Ilaka 12, a Tamang and a Brahmin/Chhetri group. These were conducted at village homes by Save the Children health staff with A. Levin's assistance. Findings were incorporated in A. Levin's 1996 report for Save the Children "Management of Childhood Pneumonia in Nuwakot, Nepal: Report on Conditions and a Proposed Intervention," and are not presented in detail in this thesis.

Record Review

Health Post, Sub-Health Post, and Mobile Clinic records were examined to gain further information about facility utilization, disease incidence, seasonal variations, treatment protocols, and recording protocols.

Table 1: Data Collection for Baseline Study

Instrument	Data Source	Number	Variable (s) to be measured
Survey 1	Exit interview of mothers who accessed care for a child under 2 with respiratory symptoms.	- 105 Mothers (26 in Ilaka 1, 52 inIlaka 12, and 27 in Ilakas 13)	- Disease recognition - Treatment seeking patterns - Comprehension of instructions and compliance
Survey 2	HPWs, VHWs, CHVs	- 12 HPWs - 7 VHWs - 81 CHVs (20 in Ilaka 1, 39 in Ilaka 12, 23 in Ilaka 12)	- Assessment, Classification, Managenent and Counseling skills
Survey 3	Traditional Healers	- 10 Traditional Healers (4 in Ilaka 1, 3 in Ilaka 12, 3 in Ilaka 1)	-Assessment, Classification, Managenent and Counseling skills - Perceptions of Western Medicine
Observation	HPWs, VHWs, CHVs Traditional Healers	- 8 Mobile Clinics - 4 Health posts - 3 Sub-health posts - 2 Pharmacies	- Assessment, Classification, Managenent and Counseling skills. - Transmission of information from providers to mothers.
Record Review	Health Post Logs SCUS Clinic Books	- 4 Health posts - 1 Sub-health post - 3 SCUS offices	- Recording methods - Disease prevalence and treatment rates - Composition of served population

All individuals who were approached agreed to participate in the study with the exception of 3 mothers who cited that they were too busy working in the fields.

Given the relatively small number of health workers in the target area, the study was designed to sample this total population. The majority of Health Post Workers, VHWs and CHVs participated.

Statistical Analysis

Frequency data and statistical associations were calculated with the use of Microsoft Excel 4.0 and Stata 6.0 software. Comparisons of CHV performance across Ilakas were examined using Chi Square tests with one degree of freedom. Comparisons of CHV performance versus VHW performance were also analyzed with Chi Square tests. The significance of the effect of literacy on CHV performance was assessed using Chi Square analysis as well as logistic regression.

III. RESULTS: Baseline Study

Health Facilities

The existing government health structure in Ilakas 1, 12, and 13 of Nuwakot consists of 4 Health Posts and 8 Sub-Health posts. The Health Posts are understaffed, have limited hours, and lack adequate drug supplies. On an average day, one can find perhaps one Health Post-in-charge, although the senior health workers often leave for several weeks at a time, relying on VHWs to watch over the post. The Sub-Health Posts are often closed. There is a frequent

turn-over in Health Post staffing, in part due to the lack of "Durgam Bhatta, " or remote allowance. For pneumonia management, all Posts are supposed to be stocked with pediatric cotrimoxazole tablets, and Health Posts with injectable procaine penicillin as well. Of the 16 Health Post Staff and VHWs asked, 8 reported that their facilities had been out of pneumonia antibiotics in the last 3 months.

The survey team identified 4 private pharmacies and visited 2 in Ilaka 12. There is a busy pharmacy in Samundratar next to the Health Post. It is run by one of the Health Post-in-charges. The pharmacy is stocked with all the necessary drugs for pneumonia case management—cotrimoxazole suspension, injectable procaine penicillin, and injectable gentamicin. There is also a government ayurvedic[5] clinic in Ilaka 12, staffed by a Kaviraj[6] who sells antibiotics after hours. The kaviraj told the interviewer that he would treat his own child with antibiotics rather than ayurvedic medications.

ARI Care Seeking Patterns

The caretakers interviewed, primarily mothers, were women who had accessed health care for a child under 2 with a suspected respiratory infection in the last 6 months. Of the 105 mothers interviewed, information about their literacy and children is provided below in Table 2.

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[5] Ayurveda originated in ancient Indian civilization as a medical approach based on the balance of mind, body, and soul. It is practiced widely in India and other developing countries and is recognized formally by the WHO. However, there is no standardized credentialing of practitioners.

[6] A Kaviraj is a government trained ayurvedic health worker. They receive 3 years of training in both ayurvedic and allopathic care.

Table 2: Mothers' Demographics

	Total (n=105)	Ilaka 1 (n=26)	Ilaka 2 (n=52)	Ilaka 13 (n=27)
% Literate	38.0%	46.0%	45.8%	26.9%
# of Living Children	2.8	3.0	2.6	2.9
# of Deceased Children	0.6	0.7	0.5	0.6

Most mothers rely on a combination of services for children with pneumonia. For *one* respiratory illness, many women responded that they sought help from multiple sources. Forty three percent of women said that they had consulted 2 or more treatment options for their child's last ARI episode, not counting Traditional Healer visits.

The use of traditional medicine is pervasive. Fifty-five percent of women reported seeking care from Traditional Healers.[7] As it was observed in focus groups that Traditional Healer use was a source of embarrassment in front of Save the Children staff, the true number of women who seek Traditional Healer treatment may be much higher. Indeed, one Health Post Staff indicated that *all* ARI cases seen at the Samundratar Health Post have been referred by a Traditional Healer. Interestingly, some women reported visiting a Traditional Healer after the Health Post, Pharmacy, or Mobile Clinic. This seems to indicate that some caretakers view modern medicine as a complement rather than a substitute for traditional care.

[7]As a caveat to future research efforts, it should be noted that confusingly, Traditional Healers are considered by some mothers and health workers to be a type of "home care" and by others to be an "outside treatment source".

Caretakers reported waiting an average of **3.7** days before seeking outside care. Only **31.4%** (23.1% in Ilaka 1, 42.3% Ilaka 12, and 18.5% in Ilaka 13) made it to treatment within 2 days. Most often, the mother bore responsibility for deciding whether or not to seek care, although in about **30%** of cases, either the father or grandparents made the decision. Virtually all mothers (2 excepted) reported that their child completed the required dose of antibiotics once care was sought and medication obtained. However, a verbal questionnaire of this nature is likely to overestimate the true extent of compliance.

Caretaker Pneumonia Knowledge

Mothers were asked to name all the danger signs of pneumonia. The results are presented below in Table 3.

Table 3: Mothers' Knowledge of Pneumonia Signs/Symptoms

	Total (n=105)	Ilaka 1 (n=26)	Ilaka 2 (n=52)	Ilaka 13 (n=27)
	(%)	(%)	(%)	(%)
Noisy Breathing (stridor, wheezing)	73.3	80.8	82.7	48.1
Fever	70.5	65.4	75.0	66.7
Fast Breathing	63.8	76.9	71.2	37.0
Chest Indrawing	41.9	61.5	46.2	14.8
Cough	33.3	15.4	67.3	37.0
Unable to drink/feed	26.7	46.2	26.9	7.4
Abnormally Sleepy	9.5	3.8	9.6	14.8
Convulsions	1.0	0.0	1.9	0.0
4 or > pneumonia symtoms/signs	33.6	42.3	40.4	11.0[A]

[A]Comparing Ilaka 13 to the pooled sample of Ilaka 1 and 12 shows an Odds Ratio for knowledge of 4 or more pneumonia signs/symptoms of 5.57 (1.54, 19.88) with a p value < 0.01 by Chi Square.

The most common sign mentioned was difficult breathing; fever and fast breathing were other likely responses. Thirty-six percent of all women interviewed were able to list 4 or more of the pneumonia danger signs. As is apparent from the Table, the level of knowledge was considerably greater among mothers in Ilakas 1 and 12 than in Ilaka 13, the most remote area. Forty-two percent and **40.4%** of mothers in Ilakas 12 and 1, respectively, could name 4 or more signs of pneumonia. The number in Ilaka 13 was significantly lower, only **11.0%.**

The national ARI program and Save the Children stress proper home care for children who have received medication or have very mild ARI. The 4 points emphasized in education efforts are keeping the child warm, feeding frequently, clearing the nose if it prevents the child from feeding, and keeping the child out of smoky or dusty environments. Mothers were asked to cite elements of appropriate home care. Responses are summarized in Table 4.

Table 4: Mothers' Knowledge of Home Treatment

	Total (n=105)	Ilaka 1 (n=26)	Ilaka 2 (n=52)	Ilaka 13 (n=27)
	(%)	(%)	(%)	(%)
Keep Child Warm	67.6	76.9	59.6	74.1
Breastfeed Frequently	35.2	19.2	48.1	25.9
Clear Nose to Allow Feeding	12.4	0.0	25.0	0.0
Home Remedy	6.7	7.7	9.6	0.0
Keep Away from Dust/Smoke	3.8	3.8	5.8	0.0
Do Nothing/Don't Know	9.5	15.4	11.5	0.0

Roughly two-thirds of mothers recognized the need to keep a sick child warm, but less than half mentioned frequent feeding as an appropriate part of care. Despite the fact that only **6.7%** mentioned some type of home remedy, from discussions with mothers in focus groups, it appears that use of local plants, especially rudilo, to make teas or hot syrups is widespread.

As a final element to the assessment of caretaker knowledge, mothers were asked to identify risk factors associated with respiratory infections. The responses, shown in Table 5, demonstrate that community members have only a vague notion of the risk factors. In particular, only a quarter cited smoke, and only about 1 in 20 mentioned malnutrition or lack of sufficient food. One out of every 5 mothers was unable to give any answer.

Table 5: Mothers' Knowledge of Pneumonia Risk Factors

	Total (n=105)	Ilaka 1 (n=26)	Ilaka 2 (n=52)	Ilaka 13 (n=27)
	(%)	(%)	(%)	(%)
Cold	51.4	65.4	44.2	51.9
Dust/Dirt	27.8	7.7	42.3	18.5
Smoke	23.8	7.7	34.6	18.5
Dirty Food or Water	8.6	7.7	13.5	0.0
Malnutrition/Lack of Sufficient Food	5.7	7.7	7.7	0.0
Don't Know	20.0	7.7	19.2	33.3

Health Worker Knowledge, Attitudes, and Practices

In this analysis, health workers have been examined in 3 groups—Health Post Workers, VHWs, and CHVs. Although Traditional Healers are outside of

the government health system, and although they were asked a different set of questions, relevant Traditional Healer information is provided below for the sake of comparison. Some basic numbers presented in Table 6 will be illustrative of survey population characteristics.

Table 6: Health Worker Background Information

	HP Staff	VHWs	CHVs	THs
Number Interviewed	12	7	81	10
Average Age	26.3	35.6	39.2	51.3
Literacy Rate	100.0	100.0	39.7	50.0
Average Years of Experience	4.5	10.7	5.1	4.5
Avg # of Children < 2 Seen per Day	7.6	3.9	2.4	2.7
Avg # of Pneumonia Cases seen Last Week in Children < 2	7.3	3.9	1.4	1.7
% with at Least 1 ARI Training	83.3	71.4	75.3	50.0
% with 2 or More ARI Trainings	25.0	14.3	12.3	NA

Health Worker Pneumonia knowledge is analyzed, according to WHO criteria, by assessment, classification, treatment, and counseling and presented in Table 7, as well as in Charts A-D in Appendix 4.

Table 7: Pneumonia Knowledge Among Health Worker Types

	HPWs	VHWs	CHVs	THs
ASSESSMENT				
Able to identify 4 or more signs/symptoms of pneumonia	58.3 %	28.6 %	35.8 %	10.0 %
Able to cite fast breathing and chest-indrawing as the 2 key diagnostic signs of pneumonia	50.0%	14.3%	35.8%	NA
CLASSIFICATION				
Able to distinguish pneumonia from no pneumonia	100.0%	71.4%	85.2%	NA
Able to distinguish pneumonia from severe pneumonia[A]	50.0%	14.3%	65.4%	NA
TREATMENT				
Able to name 4 or > signs necessitating referral	25.0% [B]	14.3%	9.9%	NA[C]
COUNSELING				
Advised to keep infant warm	91.7%	100.0%	80.2%	50.0%
Advised to breastfeed frequently	83.3%	14.3%	54.3%	20.0%
Advised on signs/symptoms requiring referral	41.7%	14.3%	3.7%	NA

[A] In theory, this marks the difference between treatment and hospital referral.

[B] HPWs also reported that mothers often will not follow their referral advice, so they hesitate to give them the requisite first dose of antibiotics.

[C] All 10 THs said they refer sick children to Health Posts, but usually after they perform the "Dhoop Achyata" rice ceremony—which can take up to an entire day.

Interestingly, a sizeable percent of health workers advised mothers to use traditional medicines such as hot mixtures of rudilo or other plant preparations. This was described by 37.5% of Health Post Workers, 28.6% of Village Health Workers, and 46.9% of Community Health Volunteers. However, when Traditional Healers were asked what they would do if their own child had pneumonia, 70.0% indicated that they would seek help at the Health Post or Mobile Clinic.

The most common problems identified by health workers included lack of antibiotics (41.7% of HPWs, 42.9 % of VHWs, 28.4 % of CHVs), mothers not following their advice (33.3% of HPWs and 28.6 % of VHWs), mothers demanding drugs (33.3% of HPWs, 14.3% of VHWs, 25.9% of CHVs), as well as poor transport and referral infrastructure (25.0% of HPWs and 57.1% of VHWs). CHVs and THs also cited lack of education (24.7% and 40.0%, respectively).

A Comparison of Health Worker Knowledge

One might expect knowledge levels and performance to be best among Health Post Workers, and worst among CHVs, with VHWs in the middle. The interview responses to 4 of the questions shown in Table 7 were compared between Health Post Workers and the other health staff, and as predicted, the former group out-preformed the latter on nearly all questions. (See Table 8). It was more surprising, however, to find that CHVs performed as well if not better than VHWs. Because of the small VHW sample size, the majority of these comparisons were not statistically significant.

Table 8: Comparison of Health Worker Knowledge

	Health Post Workers versus CHVs and VHWs (Odds Ratio)	CHVs versus VHWs (Odds Ratio)
ASSESSMENT		
Able to identify 4 or more signs/symptoms of pneumonia	2.57 (0.75, 8.79)	1.39 (0.25, 7.64)
Able to cite fast breathing and chest-indrawing as the 2 key diagnostic signs of pneumonia	1.93 (0.57, 6.55)	3.35 (0.39, 29.1)
CLASSIFICATION		
Able to distinguish pneumonia from severe pneumonia	∞[A]	11.36[B] (1.28, 100.5)
TREATMENT		
Able to name 4 or > signs necessitating referral	17.56[C] (4.44, 70.4)	0.66 (0.07, 6.11)

[A]The OR for the classification question could not be calculated given that zero Health Post Workers responded incorrectly.
[B]Denotes significance at the 1% level ($p<0.01$) by Chi Square.
[C]Denotes significance at the 0.1% level ($p<0.001$) by Chi Square.

The Impact of Literacy on CHV Performance

Only 40% of CHVs interviewed reported that they were literate (46% in Ilaka 12, 35% in Ilaka 1, 32% in Ilaka 13). The impact of literacy on CHV pneumonia knowledge is analyzed in Table 9 across the same categories of assessment, classification, and treatment. Literate CHVs were significantly more

knowledgable than illiterates in their ability to cite the 2 key diagnostic criteria and the ability to distinguish severe pneumonia from pneumonia.

Table 9: CHV Pneumonia Knowledge and Literacy

	Total (n=78)[A]	Literate (n=31)	Illiterate (n=47)	Literate versus Illiterate CHVs (Odds Ratio)
ASSESSMENT				
Able to identify 4 or more signs/symptoms of pneumonia	37.2 %	48.4%	29.8%	2.21 (0.86, 5.67)
Able to cite fast breathing and chest-indrawing as the 2 key diagnostic signs of pneumonia	23.1%	35.5%	14.9%	3.14[B] (1.06, 9.34)
CLASSIFICATION				
Able to distinguish pneumonia from severe pneumonia	64.1%	83.9%	51.1%	4.98[C] (1.63, 15.20)
TREATMENT				
Able to name 4 or > signs necessitating referral	10.3%	9.7%	10.6%	0.9 (0.20, 4.07)

[A] Of the 81 CHVs interviewed, literacy status was not obtained for 3, making the sample size 78.
[B] Denotes significance at 5% level ($p < .05$) by Chi Square.
[C] Denotes significance at 5% level ($p < .01$) by Chi Square.

One concern is that the Ilaka of residence may serve as a confounder because it may impact on both literacy and pneumonia knowledge. This is because CHVs residing in more remote Ilakas tend to be less educated and attend fewer Save the Children trainings. To control for this potential confounder, logistic regressions were run with literacy as the independent variable, controlling for

Ilaka. The results of these regressions were the same as shown in Table 9, suggesting that Ilaka of residence is not a confounder.

Records

Examination of records from the Samundratar, Sikrebesi, Rautbesi, and Likhu Health Posts and the Talakhu Sub-Health Post, revealed that record keeping is poor, and that any available ARI data is insufficient and unreliable. ARI terminology varied among posts, but no posts used standard ARI classifications to distinguish pneumonia from severe pneumonia or severe disease.[8] The books also record treatment, and in most cases cotrimoxazole was used for common colds or cough and fever. In addition, while records indicate medicines prescribed, they do not record cases without medicine nor do they record referrals. Finally, the record books are not properly designed for infant case management, as they do not have a space to record the specific age of the child. This type of age recording is not suited to proper ARI case management, which relies on age specific protocols.

In Samundratar, from Dec. 1995-June 1996, the records indicate that 330 people over age 14 were seen, 76 ages 5-14, 63 ages 1-4, and only 9 under 1 year of age. This suggests that only 18.0% of patients are children under 5. Similarly, in Sikrebesi, during a 6 month period, 8/349=2.2% were under 5 and 0.0% under 1. In Likhu, 51/233=21.0% of cases seen during a 4 month period were under 5, and at the Talakhu Sub-Health Post, during an 8 month period, 16/500=3.2%

were under 5. According to the records, there does not appear to be significant gender differences among those treated at the post.

DISCUSSION

This study provided the first characterization of pneumonia management in this remote community. The findings reveal multiple weaknesses within the health system infrastructure that impact on the quality of care available to children under 2 years of age in this impoverished district of Nuwakot. Health Post facilities—which are intended to serve as the primary source of health care in the community—are not meeting the needs of children with respiratory infections. They are often closed due to understaffing, understocked (one half were out of cotrimoxazole in the last 3 months), and not considered reliable by the community. Interviews with mothers also demonstrated that that more than 40% of them seek care for their children from multiple sources, often trying multiple treatments. A significant percent of families incorporate traditional medicine practices into their care, in many cases, prior to seeking western therapy. The reasons for this are likely multiple and may include cultural beliefs about health. In addition, convenience may play an important role since every village has a Traditional Healer while health posts can be a 5 hour walk to reach. Finally cost may also be a factor, though Traditional Healers do charge a non-monetary fee. Another important finding is that mothers wait an average of 3.7 days into an illness before seeking care outside of the home. As shown in the

[8] In Samundratar and Sikrebesi ARI is written as "cough and fever" or "pneumonia." In Rautbesi,

Jumla trial in Western Nepal, prompt treatment is essential to successful pneumonia management. In that study, they found that the mean length of time from symptom onset (fast breathing and/or chest indrawing) is 4 days, with a shorter time course for younger children [7]. The use of traditional medicine appears to contribute to this delay in Nuwakot, as does the distance to health posts, lack of confidence in their services, and the demands of parental work. It should be noted that our measure of 3.7 days is only a rough approximation, given that it is difficult for mothers to exactly pinpoint onset of symptoms, and further difficult to capture retrospectively.

Selection bias may have occurred in that the mothers were not randomly sampled. Although this is clearly not reflective of all mothers in the community, it is reflective of those mothers who access Save the Children care—the current target population. Their responses are also likely more informed that those of women unexposed to Save the Children health care or education classes.

With regard to health worker performance, the baseline study was able to characterize that all levels of trained health workers are deficient in their pneumonia knowledge base, with only 50% of Health Post Workers able to cite fast breathing and chest retractions as the 2 diagnostic criteria for pneumonia. Interestingly, CHVs appeared to have as good, if not a better, knowledge base than VHWs, with literate CHVs outperforming non-literates. There also appear to be significant differences in knowledge bases between Ilakas, with the poorest performance in Ilaka 13. This is the most impoverished and remote region, with

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it is written simply as "ARI," and in Likhu as "ARI," "severe ARI," and sometimes "pneumonia."

less Save the Children contact and higher illiteracy rates. Also of note, a significant percent of government workers admitted recommending traditional medicines, such as herbal remedies, to parents of sick children.

Given the relatively small number of health workers in the target area, the study was designed to sample this total population. The majority of Health Post Workers, VHWs, and CHVs participated. Their responses are likely representative of the total group. The selection bias may, if anything, over-estimate performance as these are the health workers most in contact with Save the Children and a greater number were from Ilaka 12 (the most educated and least remote region).

We were only able to interview a small fraction of traditional practitioners and thus the few responses cannot be assumed to be representative of the larger group. Because these Traditional Healers were known to Save the Children, their responses represent those of the most westernized selection. Of those interviewed, we found that most do refer sick children to Health Posts after their traditional ceremonies and even send their own sick children to these sites.

Record keeping is extremely poor at all Health and Sub–Health posts making estimates of pneumonia prevalence highly unreliable and making the prospect of initiating a treatment program more difficult to monitor. The disproportionately small number of children under 5 years of age seen at the Health and Sub-health posts may be due to improper recording, though some health staff ascribe the cause to lack of pediatric drugs. Pharmacies offer the preferred suspension of cotrimoxazole, and because of this may be seeing a

greater number of cases. The fact that non-medicated children are not recorded in the Health Post log books may also contribute to the seemingly low pediatric attendance. It is also possible that fewer children under 5 attend the health posts due to the Save the Children Mobile Clinics.

IV. Pilot Program

Background

Based on the findings of the baseline study, A. Levin worked in conjunction with USAID to design a pneumonia community intervention to improve access to quality care. The intervention aims to bring prompt and effective childhood pneumonia care to the village level by training Community Health Volunteers to diagnose and treat pneumonia within the community. Save the Children and the government health staff train and monitor the CHVs, supply them with antibiotics, track treatment and referral rates, and provide second-line treatment for severe cases. Detailed implementation recommendation were submitted to Save the Children in A. Levin's "Management of Childhood Pneumonia in Nuwakot District Nepal. Report on Current Conditions and a Proposed Intervention" and in Eric Starbuck's "Reports of Visits to PVO Survival Project Sites in Bangladesh and Nepal." Broadly, the proposal called for:

- Well-trained community distributors of cotrimoxazole
- Intensive and frequent monitoring by competent, well-trained supervisors
- Community involvement and enthusiasm
- A plan for recording data on treatment rates and for assessing the program

- A vision of how the program can be made sustainable

In addition to outlining many recommendations, the reports suggested that only literate CHVs be trained initially, and that Save the Children consider including Traditional Healers as well. After some discussion, it was decided to include both literate and non-literate CHVs due to a concern that segregating would be divisive. In addition, Traditional Healers were not included in the pilot program. The intervention was begun in Ilaka 12 only, because it was felt this area would be easiest to monitor.

Community-Based ARI Interventions

The concept of training community members to carry out pneumonia case management has a substantial history. Since the late 1970s, when the first report describing a successful pneumonia management program involving health auxiliaries in India was published [17], researchers have consistently demonstrated the efficacy of community-based intervention strategies. An essential foundation for these programs is the availability of a simple and accurate diagnostic algorithm. Papua New Guinea studies in the early 1980s showed the efficacy of using a respiratory rate of 50 breaths/min. or greater to detect childhood pneumonia [18]. Subsequent studies in Tanzania, Pakistan, and India have confirmed the ability of programs using this pneumonia treatment algorithm to reduce under five morality [19-21]. In Nepal, the 1986-1989 Jumla study showed for the first time that this algorithm could be applied successfully at the community level. The Jumla study found that indigenous community

workers, without prior health knowledge, could be trained to effectively diagnose and treat pneumonia in children under 5; over the 4 years of the study, the Jumla researchers documented a 28% reduction in child mortality [7]. A meta-analysis of 6 published intervention trials on case-managment of pneumonia in community settings (including Jumla) found a relative risk reduction of 20% in infant mortality and 25% reduction in under 5 mortality [22]. In light of these successes, the WHO has focused on community case management of pneumonia, and has developed training manuals for this purpose [23].

In a recent addition to the Nepal national control program, the Division of Child Health, in collaboration with John Snow Incorporated has begun "strengthening activities" in four districts—Morang, Sunsari, Makwanpur and Chitwan. In the latter two districts, Community Health Volunteers (CHVs) and Village Health Workers (VHWs) have been trained to treat pneumonia with antibiotics, while in the former two, they have received training to diagnose and refer. In May-August 1994, prior to the intervention implementation, an ethnographic study was conducted by the Division of Child Health and UNICEF in all four districts to gather information on the perceptions and practices of caretakers regarding ARI [UNICEF and HMG. 1994. *Acute Respiratory Infections Among Children in Nepal: A Focused Ethnographic Study in Selected Districts*].

The Nuwakot Intervention

The program began in 1997 as a pilot intervention in Samundratar and Balkumari VDCs of Ilaka 12 (serving a population of 2200 or 5% of the Save the Children's target population). In May 1997, representatives from John Snow Incorporated conducted a 4 day training session for 16 Save the Children health and government Health Post/Sub-Health Post Staff. Following this, the trained Save the Children staff led 3 trainings for all the CHVs in Balkumari and Samundratar (n=18). 10 of these women attended all of the session and were therefore chosen to continue with the program. They were given pneumonia beeping timers, cotrimoxazole tablets, record books, referral sheets, posters, and shoulder bags.

For the initial 3 months of the program, the VHW from Balkumari monitored the women every 2 weeks with visits to their homes. Supervision was then decreased to monthly visits. In his role as a supervisor, the VHW completes a form that is returned to Save the Children reviewing the CHV's materials, knowledge, and number of treated/referred cases. The VHW receives a per diem of 55 rupees for his work. The CHVs are also observed by the Save the Children staff when Mobile Clinic visit their respective villages, approximately once a month.

Record keeping is accomplished using pictorial forms designed by John Snow Incorporated. The forms indicate the child's age, symptoms, treatment (supportive care, antibiotics, or referral to health post), follow-up within 3 days,

and the child's status at the follow-up visit. These forms are color coded to distinguish treatment sheets from referral forms. When a CHV refers a child to the Health Post, she gives the mother a copy of the referral sheet to pass onto the Health Post Staff. These sheets are collected later by the Save the Children staff to compare referral rates with compliance.

Save the Children has designed a cost recovery program whereby CHVs charge 12 rupees (approximately 20 cents) for the 18 tablets of cotrimoxazole required to treat a child under 1 year of age and 20 rupees (approximately 35 cents) for the 30 tablets required to treat a child between 1 and 5 years of age.

Statement of Purpose

The follow-up evaluation was motivated by the following hypothesis:

- An intervention to train Community Health Volunteers as pneumonia experts and to provide them with antibiotics to locally treat the disease would improve provider knowledge and practices and expedite management of pneumonia.

The follow-up evaluation aimed to characterize the change in knowledge, attitudes, and practices of Community Health Volunteers in Nuwakot regarding the diagnosis and treatment of pneumonia in children under 2 years of age and to examine the function of the program from supervision to recording, as well as community perceptions of the intervention.

Methods

The evaluation was conducted in over a 2 week period in December 1997 using a modified version of baseline Survey 2, observation, and retrospective record review. The survey was translated from English to Nepali by Save the Children staff in Kathmandu [Appendix 3]. In Nuwakot, the surveys were administered by the same 4 Save the Children health staff in Ilaka 12 that had administered the baseline surveys. Participation was voluntary, and the surveys were administered verbally after obtaining verbal consent. Answers were not anonymous so as to be used to guide training in areas of weakness. Participants were told that the goal of the study was to learn the effectiveness of the intervention. There were no material inducements for participation. All interviewers were assisted and monitored in the field by A. Levin.

Nine CHVs were interviewed about their knowledge, practices, and perceptions using the same surveys from part one of the study.[9] In addition, these 9 CHVs were observed while examining a sick child or in role play to assess their practical skills. Finally, interviews were conducted with 3 Health Post Staff, 2 VHWs, SCUS health staff, as well as mothers at Mobile Clinic regarding their perceptions of the program.

[9] The remaining CHV had travelled outside of Nuwakot and could not be reached during the interview period.

Statistical Analysis

Analysis of post-intervention CHV performance in comparison to pre-intervention was measured using McNemar's Test for paired dichotomous data.

Findings

The records indicate that between June and November 1997, CHVs diagnosed 21 cases of pneumonia with 16 of these cases treated by the CHV and 5 referred to the health post. Most records did not indicate children seen and diagnosed with no pneumonia, which makes treatment rates difficult to assess. By the time of our departure in December 1997, and additional 20 cases were reported for a total of 41.

Comparison with baseline study responses for the same 9 women are presented below in Table 10 and reveal no significant improvement in knowledge base, with the exception of caretaker counseling.

Table 10: CHV Knowledge, Pre-Post Intervention

Criteria	% Meeting Criteria PCM 12/97 (n=9)	% Meeting Criteria Baseline7/96 (n=9)	P Value[A]
Ability to Assess 4 or > Signs/Symptoms	55.5	66.6	> 0.1
Knowledge of ARI Specific Respiratory Rates	55.5	55.5	> 0.1
Classify Severe from Non-Severe Pneumonia	66.6	11.1	.05 <p< 0.1

[A]McNemar's Test

CHV performance under observation was assessed using a checklist adopted by John Snow Incorporated and WHO material and is presented in Table 11.

Table 11: CHV Management Performance, Post Intervention

Case Management Task	% Performing Task
Asked Child's Age	78.0
Asked About Difficulty Breathing	100.0
Asked About Fever	89.0
Asked About Prior Treatment	22.0
Counted Respiratory Rate Correctly	67.0
Looked for Chest Indrawing	100.0
Gave Correct Diagnosis	78.0
Gave Proper Homecare Instructions	100.0
Offered Instructions About Signs/Symptoms Warranting Immediate Return	57.0

Most CHVs displayed a solid level of competency in their case management skills; a few appeared less comfortable with some aspects of management.

The majority CHVs appeared satisfied with the program, in part because they feel it gives them a newfound respect within their communities. All expressed interest in continued participation.

Community Perceptions

Health workers in supervisory roles were interviewed: the Health Post-in Charges in Samundratar and Rautbesi, the local pharmacist in Ilaka 12, the VHWs from Balkumari and Rautbesi, and the Save the Children staff in Ilaka 12. As noted above, a large supervision burden is placed on the VHW from Balkumari who visits each CHV once a month. He is enthusiastic about the program and recommended a longer training for the CHVs, with more focus on record keeping.

The Health Post Staff are also enthusiastic about the program; however, they do not play an extensive role in supervision due to their other government tasks. They receive referral sheets from CHVs and keep their own records. In the last 6 months, Ilaka 12, 90 children under 5 years of age were examined for suspected pneumonia—46 were diagnosed with pneumonia, 33 with severe pneumonia, and 11 with no pneumonia. They suggested expanding the program beyond Ilaka 12 to needier areas and advised that mothers could be better informed of the intervention. They also felt that Traditional Healers could be incorporated into the program. The Save the Children staff have spent a significant effort keeping track of the CHV records as well as VHW supervision sheets. One concern mentioned in the midterm evaluation is that monitoring of the program requires a substantial amount of time from an already busy staff. Most Save the Children staff recommend that the organization hire a full time

staff member whose major responsibility would be to supervise the program, particularly if it is to expand.

Local mothers attending Mobile Clinic were asked about their knowledge of the program. Unfortunately, the majority of women said that they had not heard about the new program. Most of these women, once told about it, said that they would in the future seek help from their local CHV—however, some did admit that they would fee more comfortable going to the Health Post due to lack of trust in CHV competence.

Discussion

The evaluation of this intervention is limited by lack of vital statistics data in the region resulting in the inability to measure outcomes data. Instead, we had to rely on process indicators—CHV knowledge base, performance, and perceptions of providers and patients. Comparisons of pre and post intervention knowledge base were also limited by the small sample size of the follow-up study, lack of controls, CHV familiarity with the surveys, as well as observer bias. However, the evaluation does provide valuable insights into the general function of the program and can be used to steer further development of the intervention.

The knowledge base regarding pneumonia recognition and classification was not changed above baseline. The CHVs did show an improvement in their knowledge of respiratory cut-off rates, though this was not found to be statistically significant. The only not significant improvement was in their

knowledge of homecare instructions. Given the intensive education efforts, these results are somewhat surprising, and may in part be a reflection of the fact that the program only began 6 months prior to this evaluation. With regard to performance, there are no data from comparison with baseline, but the women did appear well skilled in questioning about signs and symptoms, diagnostic skills, and homecare instructions. Areas of weakness included history taking about prior treatment and counting respiratory rates.

Treatment rates were low. This might be due to the fact that the program is new, and that the VDCs in which the program was started are a relatively short distance from the Health Post. In addition, the data was collected prior to the peak pneumonia season, which begins in November.

Finally, one of the most notable findings is that mothers did not appear to be aware of the program. For this reason, A. Levin recommended that a public education campaign with verbal outreach at Mobile Clinics, posters at health posts and at CHV homes, and possibly through street drama.

Based on these findings, recommendations were made to Save the Children regarding focused training in areas of weakness, increased hands-on training for CHVs through participation at Mobile Clinics, adjusting recording practices to document *all* cases seen (not only those treated) so as to better monitor treatment rates, and increased publicity. It was also recommended that Save the Children include CHVs in the most remote Ilaka—13—which is in much more need of village-based services.

Future Directions

The intervention raises many additional public health policy questions. The first issue revolves around the costs and benefits of a vertical program of this nature—one that focuses solely on a single childhood illness, rather than a more integrated approach to childhood disease and the major pediatric killers—diarrhea, pneumonia, measles, malaria, and malnutrition. While a program like the one in Nuwakot may have the potential to train pneumonia experts, it does not take into account the larger disease context. In addition, it draws significant resources from Save the Children that might be devoted to a broader approach, and it runs the risk of duplicating efforts. The WHO has increasingly advocated an integrated management of childhood illness; the 1996 mandate of WHO's Division of Diarrheal and Acute Respiratory Infections modified and expanded to form the Division of Child Health and Development [24, 25].

Another important issue to consider is the degree of integration with the existing government health infrastructure. The Jumla study, which is the model for many ARI community interventions, was well-funded and completely bypassed the government system. While this strategy has clear benefits, in Nuwakot, the goal is to work closely with the existing Nepali health care system, with the hopes that one day the Save the Children programs can be handed over to the Nepali government. Logistically, it is clearly difficult for Save the Children to coordinate this work with the government staff. In addition, it raises the

important question of sustainability. Sustainability will depend on coordination with the health infrastructure, financial independence, continued training, and community acceptance [26].

Finally, there is the issue of antibiotic resistance. More widespread use of antibiotics in the community may be creating selective pressures that favor the emergence of resistant organisms. Cotrimoxazole remains the standard first-line agent for pediatric pneumonia by the WHO because it is inexpensive, easy to administer, and readily available. However, resistance of *S. pneumoniae* and *H. influenzae* has been identified as an increasing problem in several countries, with substantial geographic variability [27-28]. However it should be noted that several recent studies, including one in Pakistan, have attempted to demonstrate that resistance does not impair clinical outcomes, at least in cases of non-severe pneumonia—though actual causality is difficult to establish [29]. The WHO advocates surveillance of antimicrobial resistance of *S. pneumoniae* and *H. influenzae.* On the basis of several studies that suggest that susceptibility patterns of nasopharyngeal isolates of these organisms approximate those found in blood isolates, and on the basis of ease of collection and cost effectiveness, the WHO recommends antimicrobial surveillance through surveys of nasopharyngeal swab specimens from children with pneumonia [30]. No data on antimicrobial resistance patterns of these organisms exists for Nuwakot or in Nepal. For this reason, it would be valuable to study antimicrobial resistance patterns in the region, perhaps by collecting nasophargyngeal swabs from with suspected pneumonia. A study of this nature could also be used to serotype the

pneumococci to gain a better understanding of region-specific subtypes that may ultimately contribute to the development of polysaccharide conjugate vaccines that can be formulated for developing countries.

References

1. World Health Organization. 1981. Clinical management of acute respiratory infections in children: a WHO memorandum. *Bull. World Health Organ*. 59: 707-711.

2. Stansfield, S. 1987. Acute respiratory infections in the developing world: strategies for prevention, treatment, and control. *Pediatr. Infect. Dis. J.* 6: 622-629.

3. Bale, J.R. 1990. Creation of a research program to determine the etiology and epidemiology of acute respiratory infection among children in developing countries. *Rev. Infect. Dis.* 12: s861-s1041.

4. Berman, S., and McIntosh, K. 1985. Selective primary health care: strategies for control of disease in the developing worlds. XXI. acute respiratory infections. *Rev. Infect. Dis.* 7: 674-691.

5. World Health Organization. 1998. Acute respiratory infections: the forgotten pandemic. *Bull. World Health Organ*. 76: 101-103.

6. Shamebo, D., Sandstrom, A., Muhe, L., Krantz, I., Lonnberg, G. et al. 1993. The Butajira project in Ethiopia: a nested case-referent study of under-five mortality and its public health determinants. *Bull. World Health Organ*. 71: 389-396.

7. Pandey, R.M., Dualaire N.M, Starbuck, E.S., Houston, R.M., McPherson, K. 1991. Reduction in total under-five mortality in western Nepal though community-based antimicrobial treatment of pneumonia. *Lancet*. 338: 993-997.

8. Forgie, I.M., O'Neill, K.P., Lloyd-Evans, N., Leinohen, M., Camobell, H., et al. 1991. Etiology of acute lower respiratory tract infections in Gambian children: acute lower respiratory tract infections in infants presenting at the hospital. *Pediatr. Infect. Dis. J.* 10: 33-41.

9. Barker, J., Gratten, M., Riley, I., Lehmann, D., Montgomery, J., et al. 1989. Pneumonia in children in the eastern highlands of Papua New Guinea: a bacteriologic study of the patients selected by standard clinical criteria. *J.Infect. Dis.* 159: 348-52.

10. World Health organization. 1992. *Technical basis for the WHO recommendations on the management of pneumonia in children at first-level health facilities.* WHO/ARI/92.20. Geneva: World Health Organization.

11. Monto, A.S., and Lehmann, D. 1998. Acute respiratory infections in children: prospects for prevention. *Vaccine*. 16: 1582-1588.

12. World Health Organization. 1982. Guidelines for research in acute respiratory infections: memorandum from a WHO meeting. *Bull. World Health Organ*. 60: 521-533.

13. World Health organization. 1994. *Health Facility Survey Manual. Case Management of Acute Respiratory Infections.* Geneva: World Health Organization.

14. United Nations Development Programme. 1995. *Human Development Report.* New York: Oxford University Press. 155-169.

15. CIA factbook. http://www.cia.gov/cia/publications/factbook/np.html

16. His Majesty's Governement of Nepal Ministry of Health. 1994. *Annual Report Department of Health Services.* Kathmandu: Nepal Ministry of Health.

17. McCord C., andKielmann, A.A. 1978. A successful programme for the medical auxiliaries treating childhood diarrhoea and pneumonia. *Trop. Doct.* 8: 220-25.

18. Shann, F., Hart, K., and Thomas, D. 1984. Acute lower respiratory tract infection in children: possible criteria for selection of patients for antibiotic therapy and hospital admissions. *Bull. World Health Organ*. 62: 77-82.

19. Mtango, F.D., and Neuvians, D. 1986. Acute respiratory infections in children under five years. control project in Bagamoyo, Tanzania. *Trop. Med. Hygie.* 80: 851-58.

20. Khan, A.J., Khan, J.A., Akbar, M., and Addiss, D.G. 1990. Acute respiratory infections in children: a case management intervention in Abbattabad District, Pakistan. *Bull. World Health Organ*. 68: 577-85.

21. Bang A.T., Bang, R.A., Tale, O., Sontakke, P., Solanki, J., et al. 1990. Reduction in pneumonia mortality and total childhood mortality by means of community-based intervention trials in Gadchiroli, India. *Lancet*. 336: 201-206.

22. Sazawal, S. and Black, R. 1992. Meta-analysis of intervention trials on case management of

pneumonia in community settings. *Lancet*. 340: 528-533.

23. World Health Organization. 1992. *Treating children with a cough or difficult breathing: a course for the community health workers.* WHO/ARI/94.31. Geneva: World Health Organization.

24. Wolfheim, C. 1998. From disease control to child health and development. *World Health Forum*. 19: 178-179.

25. World Health Organization. 1997. Integrated management of childhood illness: conclusions. *Bull. World Health Organ.* 75: s119-128.

26. Berman, P. 1995. *Health Sector Reform in Developing Countries: Making Health Development Sustainable*. Boston: Harvard University Press. 13-31.

27. Mastro, T.D., Nomani, N.K., Ishaq, Z., Ghafoor, A., Shaukat, N.F. et al. 1993. Use of nasopharyngeal isolates of Streptococcus pneumoniae and Haemophilus influenze from children in Pakistan for surveillance for antimicrobial reistance. *Pediatr. Infect. Dis. J.* 12: 824-830.

28. Ostroff, M.S., Harrison, L.H., Khallaf, N., Assaas, MT, Guirguis, N.I. et al. 1996. Resistance patterns of Streptococcus pneumoniae and Haemophilus influenzae isolates recovered in Egypt from children with pneumonia. *Clin. Infect. Dis.* 23: 1069-1071.

29. Straus, W.L., Qazi, S.A., Kundi, Z., Nomani, N.K., and Schwartz, B. 1998. Antimicrobial resistance and clinical effectiveness of co-trimoxazole versus amoxycillin for pneumonia among children in Pakistan: randomised controlled trial. *Lancet*. 352: 2270-274.

30. World Health Organization/Centers for Disease Control and Prevention. 1994. *Manual for the national surveillance of antimicrobial resistance of S. pneumoniae and H. influenzae: epidemiological and microbiological methods.* Geneva: World Health Organization.

A. Levin with CHV measuring respiratory rate of an ill child.

CHVs in Pneumonia Program at clinic in Samundratar.

WORLD HEALTH ORGANIZATION

MANAGEMENT OF THE CHILD WITH COUGH OR DIFFICULT BREATHING

ari

ASSESS

ASK:

- How old is the child?
- Is the child coughing? For how long?
- Age 2 months up to 5 years: Is the child able to drink? Age less than 2 months: Has the young infant stopped feeding well?
- Has the child had fever? For how long?
- Has the child had convulsions?

LOOK, LISTEN:

(Child must be calm)

- Count the breaths in one minute
- Look for chest indrawing
- Look and listen for stridor.
- Look and listen for wheeze
  Is it recurrent?
- See if child is abnormally sleepy, or difficult to wake
- Feel for fever or low body temperature (or measure temperature).
- Look for severe malnutrition.

Fast Breathing

- Young infant aged less than 2 months: **60 breaths per minute or more**
- Child aged 2 months up to 12 months: **50 breaths per minute or more**
- Child aged 1 up to 5 years: **40 breaths per minute or more**

A child has CHEST INDRAWING if

THE LOWER CHEST WALL GOES IN WHEN THE CHILD BREATHES IN

CHEST INDRAWING is a sign of severe pneumonia in children aged 2 months up to 5 years

ONLY SEVERE CHEST INDRAWING is a sign of severe pneumonia in young infants

CLASSIFY THE ILLNESS

Does child have danger signs?

THE CHILD AGE 2 MONTHS UP TO 5 YEARS

SIGNS:	● Not able to drink, ● Convulsions, ● Abnormally sleepy or difficult to wake, ● Stridor in calm child, or ● Severe malnutrition.
CLASSIFY AS:	VERY SEVERE DISEASE
TREATMENT:	→ Refer URGENTLY to hospital. → Give first dose of an antibiotic. → Treat fever, if present. → Treat wheezing, if present. → If cerebral malaria is possible, give an antimalarial.

THE YOUNG INFANT (AGE LESS THAN 2 MONTHS)

SIGNS:	● Stopped feeding well, ● Convulsions, ● Abnormally sleepy or difficult to wake, ● Stridor in calm child, ● Wheezing, or ● Fever or low body temperature
CLASSIFY AS:	VERY SEVERE DISEASE
TREATMENT:	→ Refer URGENTLY to hospital → Keep young infant warm → Give first dose of an antibiotic

Does child have pneumonia?

SIGNS:	● Chest indrawing. (If also recurrent wheezing, go directly to → *Treat Wheezing*).	● No chest indrawing, and ● Fast breathing (50 per minute or more if child 2 months up to 12 months; 40 per minute or more if child 12 months up to 5 years.)	● No chest indrawing, and ● No fast breathing (Less than 50 per minute if child 2 months up to 12 months; Less than 40 per minute if child 12 months up to 5 years.)
CLASSIFY AS:	SEVERE PNEUMONIA	PNEUMONIA	NO PNEUMONIA: COUGH OR COLD
TREATMENT:	→ Refer URGENTLY to hospital. → Give first dose of an antibiotic → Treat fever, if present → Treat wheezing, if present. (If referral is not feasible, treat with an antibiotic and follow closely.)	→ Advise mother to give home care. → Give an antibiotic. → Treat fever, if present → Treat wheezing, if present. → Advise mother to return with child in 2 days for reassessment, or earlier if the child is getting worse	→ If coughing more than 30 days, refer for assessment. → Assess and treat ear problem or sore throat, if present. → Assess and treat other problems. → Advise mother to give home care. → Treat fever, if present. → Treat wheezing, if present.

SIGNS:	● Severe chest indrawing, or ● Fast breathing (60 per minute or MORE).		● No severe chest indrawing, and ● No fast breathing (LESS than 60 per minute).
CLASSIFY AS:	SEVERE PNEUMONIA		NO PNEUMONIA: COUGH OR COLD
TREATMENT:	→ Refer URGENTLY to hospital. → Keep young infant warm → Give first dose of an antibiotic. (If referral is not feasible, treat with an antibiotic and follow closely.)		→ Advise mother to give following home care: → Keep young infant warm. → Breastfeed frequently. → Clear nose if it interferes with feeding. → Return quickly if: → Breathing becomes difficult. → Breathing becomes fast. → Feeding becomes a problem. → The young infant becomes sicker.

	Reassess in 2 days a child who is taking an antibiotic for pneumonia:		
SIGNS:	WORSE ● Not able to drink. ● Has chest indrawing ● Has other danger signs	THE SAME	IMPROVING ● Breathing slower. ● Less fever ● Eating better
TREATMENT:	→ Refer URGENTLY to hospital	→ Change antibiotic or refer.	→ Finish 5 days of antibiotic.

WHO/ARI/94.3t JANUARY 1994

TREATMENT INSTRUCTIONS

Give an Antibiotic

ANTIBIOTICS SHOULD NOT BE USED FOR COUGHS OR COLDS

→ Give first dose of antibiotic in clinic.

→ Instruct mother on how to give the antibiotic for five days at home (or to return to clinic for daily procaine penicillin injection).

AGE or WEIGHT	COTRIMOXAZOLE trimethoprim + sulphamethoxazole → Two times daily for 5 days			AMOXYCILLIN → Three times daily for 5 days		AMPICILLIN → Four times daily for 5 days		PROCAINE PENICILLIN → Once daily for 5 days. Intramuscular Injection
	Adult Tablet single strength (80 mg trimethoprim + 400 mg sulphamethoxazole)	Pediatric Tablet (20 mg trimethoprim + 100 mg sulphamethoxazole)	Syrup (40 mg trimethoprim + 200 mg sulphamethoxazole per 5ml)	Tablet 250 mg	Syrup 125 mg in 5 ml	Tablet 250 mg	Syrup 250 mg in 5 ml	
Less than 2 months (< 5 Kg)*	1/4**	1**	2.5 ml**	1/4	2.5 ml	1/2	2.5 ml	200,000 units
2 months up to 12 months (6-9 kg)	1/2	2	5.0 ml	1/2	5.0 ml	1	5.0 ml	400,000 units
12 months up to 5 years (10-19 kg)	1	3	7.5 ml	1	10.0 ml	1	5.0 ml	800,000 units

* Give oral antibiotic for 5 days at home only if referral is not feasible.

** If the child is less than 1 month old, give 1/2 pediatric tablet or 1.25 ml syrup twice daily. Avoid cotrimoxazole in infants less than one month of age who are premature or jaundiced.

Advise Mother to Give Home Care

*(For the child age 2 months up to 5 years)**

→ Feed the child.
- → Feed the child during illness.
- → Increase feeding after illness.
- → Clear the nose if it interferes with feeding.

→ Increase fluids.
- → Offer the child extra to drink.
- → Increase breast-feeding.

→ Soothe the throat and relieve the cough with a safe remedy.

→ Most important: In the child classified as having No Pneumonia: Cough or Cold, watch for the following signs and return quickly if they occur:
- → Breathing becomes difficult.
- → Breathing becomes fast.
- → Child is not able to drink
- → Child becomes sicker.

This child may have pneumonia.

* *See section on young infant in CLASSIFY THE ILLNESS on the other side for home care instructions for that age group.*

Treat Fever

39° Centigrade or more means a HIGH FEVER

38° to 39° Centigrade means FEVER, NOT HIGH

35.5° Centigrade or less means LOW BODY TEMPERATURE

● Fever is high (≥ 39° C).	● Fever is not high (38°-39° C).
→ Give paracetamol.	→ Advise mother to give more fluids

In a falciparum malarious area:
- ● Any fever, or
- ● History of fever

→ Give an antimalarial (or treat according to your malaria programme recommendations).

- ● Fever for more than five days.

→ Refer for assessment.

PARACETAMOL doses:
- Every six hours

Age or Weight	100 mg tablet	500 mg tablet
2 months up to 3 years 6-14 kgs	1	1/4
3 years up to 5 years 15-19 kgs	1 1/2	1/2

FEVER ALONE IS NOT A REASON TO GIVE AN ANTIBIOTIC EXCEPT IN A YOUNG INFANT AGED LESS THAN 2 MONTHS.

TREAT A YOUNG INFANT WITH FEVER OR LOW BODY TEMPERATURE AS VERY SEVERE DISEASE

Treat Wheezing

Children with First Episode of Wheezing

If in respiratory distress → Give a rapid-acting bronchodilator and r
If not in respiratory distress → Give oral salbutamol.

Children with Recurrent Wheezing (Asthma)

- ● Give a rapid acting bronchodilator
- ● Assess the child's condition 30 minutes later:

IF:	THEN
RESPIRATORY DISTRESS OR ANY DANGER SIGN →	Treat for SEVERE PNEUMONIA or VERY SEVERE DISEASE (refer).
NO RESPIRATORY DISTRESS AND:	
FAST BREATHING →	Treat for PNEUMONIA. Give oral salbutamol.
NO FAST BREATHING →	Treat for NO PNEUMONIA: COUGH OR COLD. Give oral salbutamol.

RAPID ACTING BRONCHODILATOR	
Nebulized Salbutamol (5 mg/ml)	0.5 ml Salbutamol plus 2.0 ml sterile water
Subcutaneous Epinephrine (adrenaline) (1 : 1000 = 0.1%)	0.01 ml per kg body weight

ORAL SALBUTAMOL Three times daily for five days

AGE or WEIGHT	2 mg tablet	4 mg tablet
2 months up to 12 months (<10kg)	1/2	1/4
12 months up to 5 years (10-19 kg)	1	1/2

Survey 1: Mothers Who Have Recently Accessed ARI Care

Consent:

Hello. My name is _____ and I work with Save the Children US. You are invited to participate in a survey to examine community management of respiratory infections in children. We are interviewing the community health workers in Nuwakot along with mothers who have had children with respiratory infections. The purpose of the study is to learn more about childhood respiratory illnesses in Nuwakot so that Save the Children and the Nepal Ministry of Health can help mothers to prevent these illnesses and can help the community to improve the care that children receive when they are ill. It would be appreciated if you would answer some questions about your experiences with childhood respiratory infections. If you decide to participate, your identity will remain confidential. The interview should last approximately twenty minutes, and you can refuse to answer questions at any time. We also want you to know that you are free to choose not to interview and that no adverse consequences will result if you decide not to participate.

Identification:

Code: M VDC: Date: Surveyor:

Demographics:

Number of children—living: deceased:

Literacy: Caste/Ethnicity:

Experience:

1. Have you had a child under two with a respiratory infection in the last 6 months? If yes, continue with survey; if no, stop here.

2. How old is this child? Years: Months:

3. Is this child a boy or a girl? Boy [ ] Girl [ ]

4. Was this your first experience with respiratory infections, or have your other children had them? First experience [ ] Second or more [ ]

5. Did you seek help for this child from outside of your home? Yes [ ] No [ ]
   If yes, where was the first place you went for help?

5.1	CHV	[ ]
5.2	VHW	[ ]
5.3	Health post worker	[ ]
5.4	Pharmacist (Medical Hall)	[ ]
5.5	Dhamis/ Jhankris	[ ]
5.6	Mobile Clinic	[ ]
5.7	Other (specify)	[ ]

6. Where were the next place (s) you went for help (in order--number the brackets)?

6.1	CHV	[ ]
6.2	VHW	[ ]
6.3	Health post worker	[ ]
6.4	Pharmacist	[ ]
6.5	Dhamis/ Jhankris	[ ]
6.6	Mobile Clinic	[ ]
6.7	Other (specify)	[ ]
6.8	Did not seek additional help	[ ]

7. On what day of the illness did you first seek help from outside of the home?

7.1	Day 1	[ ]
7.2	Day 2	[ ]
7.3	Day 3	[ ]
7.4	Other	[ ]

8. What symptoms/signs made you decide to seek help?

8.1	Not able to drink	[ ]
8.2	Convulsions	[ ]
8.3	Abnormally sleepy	[ ]
8.4	Stridor in calm child	[ ]
8.5	Wheezing	[ ]
8.6	Fever or low body temperature	[ ]
8.7	Severe lower chest indrawing	[ ]
8.8	Fast breathing	[ ]
8.9	Difficulty breathing	[ ]
8.10	Other (specify)	[ ]

9. Who in your family made the decision to seek care outside of the home?

9.1	The mother herself	[ ]
9.2	Father	[ ]
9.3	Mother-in-law	[ ]
9.4	Father-in-law	[ ]
9.5	Other (specify)	[ ]

10. Did you treat the child at home before you sought outside help? Yes [ ] No [ ]
If yes, how?

10.1	Cough syrup	[ ]
10.2	Tea	[ ]
10.3	Left-over antibiotics	[ ]
10.4	Other (specify)	[ ]

11. Were you able to follow the advice of the health provider(s) you saw? Yes [ ] No [ ]
If not, why? (mark all answers)

11.1	Cost	[ ]
11.2	Facility too far	[ ]
11.3	Did not understand instructions	[ ]
11.4	Facility only open limited hours	[ ]
11.5	Prior bad experience	[ ]
11.6	Other (specify)	[ ]

Mothers past ARI experience

12. Did the health worker give you antibiotics for your infant/child ? Yes [ ] No [ ]
If yes, did you complete the dose ? Yes [ ] No [ ]
If not, why ?

12.1	Child got better	[ ]
12.2	Child got sicker	[ ]
12.3	Did not understand directions	[ ]
12.4	Other (specify)	[ ]

13. What did you expect from the health provider when you asked for help?
(mark all answers)

13.1	Medication	[ ]
13.2	Home therapy	[ ]
13.3	Examination	[ ]
13.4	Education	[ ]
13.5	Other (specify)	[ ]

14. Were you satisfied with the service? Yes [ ] No [ ]
If not, why?

15. Did you feel you were able to communicate with the
health provider? Yes [ ] No [ ]
If not, why?

16. Where will you first seek help if your child has a respiratory illness again?

16.1	CHV	[ ]
16.2	VHW	[ ]
16.3	Health Post Worker	[ ]
16.4	Pharmacist	[ ]
16.5	Hospital/Health Post	[ ]
16.6	Dhamis/Jhankris	[ ]
16.7	Relatives	[ ]
16.8	Other (specify)	[ ]

Knowledge:

17. Can you name some symptoms/signs of respiratory infections?

17.1	Not able to drink	[ ]*
17.2	Convulsions	[ ]*
17.3	Abnormally sleepy	[ ]*
17.4	Stridor in calm child	[ ]*
17.5	Wheezing	[ ]*
17.6	Fever or low body temperature	[ ]*
17.7	Severe chest indrawing	[ ]*
17.8	Fast breathing	[ ]*
17.9	Difficulty breathing	[ ]*
17.10	Other	[ ]

4 or more correct? Yes [ ] No [ ]

18. What could you do at home for a child with a respiratory infection?

18.1	Breast feed frequently	[ ]*
18.2	Clear the nose if interferes with feeding	[ ]*
18.3	Keep the child warm	[ ]*

2 or more correct? Yes [ ] No [ ]

19. For what respiratory symptoms should you contact a health worker for help?

19.1	Breathing becomes difficult	[ ]*
19.2	Breathing becomes fast	[ ]*
19.3	Child is not feeding well	[ ]*
19.4	Child is unable to drink	[ ]*
19.5	Child becomes sicker	[ ]*
19.6	Other	[ ]

3 or more correct? Yes [ ] No [ ]

20. What do you think causes respiratory infections?

21. Would you like if CHVs could give you antibiotics? Yes [ ] No [ ]

22. How much would you pay for antibiotics ? Rs. .....

Comments:

Survey 2: Health Post Workers, VHWs, CHVs, and Pharmacists

Consent:

Hello. My name is _____ and I work with Save the Children US. You are invited to participate in a survey to examine community management of respiratory infections in children. We are interviewing the community health workers in Nuwakot along with mothers who have had children with respiratory infections. The purpose of the study is to learn more about childhood respiratory illnesses in Nuwakot so that Save the Children and the Nepal Ministry of Health can help mothers to prevent these illnesses and can help the community to improve the care that children receive when they are ill. It would be appreciated if you would answer some questions about your experiences with childhood respiratory infections. If you decide to participate, your identity will remain confidential. The interview should last approximately twenty minutes, and you can refuse to answer questions at any time. We also want you to know that you are free to choose not to interview and that no adverse consequences will result if you decide not to participate.

Identification:

Code: HW Health worker type: VDC:

Date: Surveyor:

Demographics:

Age: Sex: M [ ] F [ ] Literacy: Caste/Ethnicity :

Health Worker Background:

1. How long have you been treating sick children? Years: Months:
2. How many children (all reasons) do you see on an average day?
3. About how many children under two with suspected ARI did you see last week?
4. Have you had a training in ARI case management in children?
   If no go to #5. If yes:
   - 4.1 When? Month: Year: How many days:
   - 4.2 Type? Video [ ] Talk [ ] Manual [ ] Other (specify) [ ]
   - 4.3 Did the training include supervised clinical practice? Yes [ ] No [ ]
   - 4.4 How could the training be improved?
   - 4.5 Would you like more training about respiratory tract infections? Yes [ ] No [ ]

Assessing Pneumonia Signs and Symptoms:

5. In a one month old child with a cough, for what signs or symptoms would you ask or look for? (more than one answer; answers will not be prompted)

5.1	Stopped feeding well	[ ]*
5.2	Convulsions	[ ]*
5.3	Abnormally sleepy or difficult to wake	[ ]*
5.4	Stridor in calm child	[ ]*
5.5	Wheezing	[ ]*
5.6	Fever/low body temperature	[ ]*
5.7	Severe Chest indrawing	[ ]*
5.8	Fast breathing	[ ]*
5.9	Severe Malnutrition	[ ]
5.10	Difficult breathing	[ ]
5.11	Not able to drink	[ ]

4 or more correct answers? Yes [ ] No [ ]

6. In a 7 month old child with a cough, how many breaths per minute is fast breathing? (only one answer)

6.1	60 or more	[ ]
6.2	50 or more	[ ]*
6.3	40 or more	[ ]
6.4	Other (specify)	[ ]

Correct? Yes [ ] No [ ]

7. What do you usually use when you count the respiratory rate?

7.1	Sounding timer	[ ]*
7.2	Individual watch	[ ]*
7.3	Sand timer	[ ]*
7.4	Wall clock	[ ]*
7.5	No timing device	[ ]
7.6	Other (specify)	[ ]

One or more correct answer (s)? Yes [ ] No [ ]

8. In a one year old child with pneumonia, where on the chest and when during the child's breathing would you look for chest indrawing?

8.1	In the lower chest wall, when the child breaths IN	[ ]*
8.2	Other (specify)	[ ]

Correct? Yes [ ] No [ ]

Classifying Pneumonia Signs and Symptoms:

9. How would you classify this 14 month old child? He has been coughing for 3 days with a fever. He has a breathing rate of 56 per minute, and lower chest indrawing. He has no other symptoms or signs (only one answer)

9.1	Very severe pneumonia	[ ]
9.2	Severe pneumonia	[ ]*
9.3	Pneumonia	[ ]
9.4	No pneumonia, cough or cold	[ ]
9.5	Other (specify)	[ ]

Correct? Yes [ ] No [ ]

10. How would you classify this 3 week old child. She is coughing but feeding well, without fever or convulsions. There is no chest indrawing, and no unusual breathing sounds. The respiratory rate is 48 per minute. She has no other signs or symptoms (only one answer).

10.1	Very severe pneumonia	[ ]
10.2	Severe pneumonia	[ ]
10.3	Pneumonia	[ ]
10.4	No pneumonia, cough or cold	[ ]*
10.5	Other (specify)	[ ]

Correct? Yes [ ] No [ ]

Managing Children with Pneumonia:

11. How would you manage a 6 week old child with severe pneumonia? (More than one answer)

11.1	Refer urgently to hospital in Trishuli	[ ]*
11.2	Give first dose antibiotics	[ ]*
11.3	Keep infant warm	[ ]*
11.4	Give antibiotics at home	[ ]
11.5	Give supportive home care	[ ]
11.6	Other (specify)	[ ]

Both 11.1 and 11.2 correct? Yes [ ] No [ ]

12. For what sign would you decide to give antibiotics at home to a 2 year old child with a cough? (For CHVs, what are the two most important signs of pneumonia?)

12.1	Not able to drink	[ ]
12.2	Convulsions	[ ]
12.3	Abnormally sleepy or difficult to wake	[ ]
12.4	Stridor in a calm child	[ ]
12.5	Severe malnutrition	[ ]
12.6	Chest indrawing	[ ] (*)
12.7	Fast breathing	[ ]* (*)
12.8	Other (specify)	[ ]

Correct? Yes [ ] No [ ]

Counseling Caretakers of Children with Pneumonia:

13. For what reasons would you advise the mother of a 3 year old child with a simple cough back to the health facility without delay? (more than one answer)

13.1	Breathing becomes difficult	[ ]*
13.2	Breathing becomes fast	[ ]*
13.3	Child is not able to drink	[ ]*
13.4	Child becomes sicker	[ ]*
13.5	Cough is persisting	[ ]
13.6	Child has fever	[ ]
13.7	Other (specify)	[ ]

Two or more answers correct? Yes [ ] No [ ]

14. What advice on home care would you give to the mother of a 6 week old child with a cough or cold, but no pneumonia? (more than one answer)

14.1	Keep infant warm	[ ]*
14.2	Breastfeed frequently	[ ]*
14.3	Clear nose if interferes with feeding	[ ]*
14.4	Return quickly if breathing becomes difficult	[ ]*
14.5	Return quickly if breathing becomes a faster	[ ]*
14.6	Return quickly if feeding becomes a problem	[ ]*
14.7	Return quickly if child becomes sicker	[ ]*
14.8	Other (specify)	[ ]

Four or more correct? Yes [ ] No [ ]

Summary of Key Indicators:

Assessment: correct answers to Q.5, Q.7 and Q.8?	**Yes [ ]**	**No [ ]**
Classification: correct answers to Q. 9 and Q. 10?	**Yes [ ]**	**No [ ]**
Treatment: correct answers to Q.11 and Q.12?	**Yes [ ]**	**No [ ]**
Counseling: correct answers to Q.13 and Q.14?	**Yes [ ]**	**No [ ]**

Facility Capacity for Case Management:

15. What are the main difficulties or constraints that you have when you manage children with cough or difficult breathing?

15.1	Case load too large	[ ]
15.2	Too little time to count breaths or do other assessment tasks	[ ]
15.3	No timing device available	[ ]
15.4	Antibiotics not available	[ ]
15.5	Need training	[ ]
15.6	Mothers demand drugs	[ ]
15.7	Referral facilities not adequate	[ ]
15.8	Poor transportation to referral facility, need to treat at home	[ ]
15.9	Other (specify)	[ ]

16. Has the health facility been out of stock of antibiotics in the last three months? Yes [ ] No [ ]
    16.1 If yes, how many times?

17. Where else can patients get antibiotics?

17.1	Pharmacists	[ ]
17.2	Other (specify)	[ ]

18. Would you like if CHVs could carry their own supply of antibiotics to treat pneumonia?
    Yes [ ] No [ ]

19. If your own child had symptoms of pneumonia, where would you first seek treatment?

20. Do you advise caretakers to use traditional medicines? Yes [ ] No [ ]
    20.1 If yes, what?

21. If your own child had pneumonia, would you use traditional medicines?
    21.1 If so, what?

Comments:

Survey 3: Traditional Healers

Consent:

Hello. My name is _____ and I work with Save the Children US. You are invited to participate in a survey to examine community management of respiratory infections in children. We are interviewing the community health workers in Nuwakot along with mothers who have had children with respiratory infections. The purpose of the study is to learn more about childhood respiratory illnesses in Nuwakot so that Save the Children and the Nepal Ministry of Health can help mothers to prevent these illnesses and can help the community to improve the care that children receive when they are ill. It would be appreciated if you would answer some questions about your experiences with childhood respiratory infections. If you decide to participate, your identity will remain confidential. The interview should last approximately twenty minutes, and you can refuse to answer questions at any time. We also want you to know that you are free to choose not to interview and that no adverse consequences will result if you decide not to participate.

Identification:

Code: TH Health worker type: VDC:

Date: Surveyor:

Demographics:

Age: Sex: M [ ] F [ ] Literacy: Caste/Ethnicity :

Health Worker Background:

1. How long have you been treating sick children? Years: Months:

2. How many children under two (all reasons) do you see on an average day?

3. About how many children under two with suspected pneumonia did you see last week?

4. Have you had a training in ARI case management in children?
   If no go to #5. If yes:
   - 4.1 When? Month: Year: How many days:
   - 4.2 Type? Video [ ] Talk [ ] Manual [ ] Other (specify) [ ]
   - 4.3 Did the training include supervised clinical practice? Yes [ ] No [ ]
   - 4.4 How could the training be improved?
   - 4.5 Would you like more training about respiratory tract infections? Yes [ ] No [ ]

Knowledge:

5. What are the main signs of pneumonia?

5.1 cough	[ ]
5.2 chest indrawing	[ ]
5.3 fast breathing	[ ]
5.4 wheezing	[ ]
5.5 fever	[ ]
5.6 difficult breathing	[ ]
5.7 other	[ ]

6. What are the main causes of pneumonia?

Management:

7. How would you manage a 6 week old child with pneumonia?

8. Would you ever send a child to the health post/ hospital? If so, which one?

9. For what signs would you send a child to the health facility?

10. What advice would you give to the mother of a one year old child with cough or cold but no pneumonia?

11. What difficulties do you have when managing pneumonia?

12. If your own child had pneumonia, what would you do first?

13. What are the sicknesses you see most often?

Comments:

Survey 2B : CHVs Follow-up

Consent:

Hello. My name is _____ and I work with Save the Children US. You are invited to participate in a survey to examine the new program in which CHVs are trained to diagnose and treat pneumonia in children. We are interviewing the community health workers in Nuwakot along with mothers who have had children with suspected respiratory infections. The purpose of the study is to learn more about the CHV program to treat pneumonia in children so that Save the Children and the Nepal Ministry of Health can help the community to improve the care that children receive when they are ill. It would be appreciated if you would answer some questions about your experiences with childhood respiratory infections. If you decide to participate, your identity will remain confidential. The interview should last approximately ten minutes, and you can refuse to answer questions at any time. We also want you to know that you are free to choose not to interview and that no adverse consequences will result if you decide not to participate.

Identification:

Code: HW Health worker type: VDC: Ward No:

Date: Surveyor:

Demographics:

Age: Sex: M [ ] F [ ] Literacy: Caste/Ethnicity :

Training and Materials:

1. When did you receive training in pneumonia case management?

2. How many days did you attend the training?

3. How frequently are you visited by a SCUS member to observe your management of pneumonia?

   every two weeks

   every month

   other:

4. Do you feel that you are adequately supervised?

   if not, why?

5. Pneumonia timer yes no
   Pneumonia referral book yes no
   Treatment book yes no

CHV Pneumonia Knowledge

Treatment Card	yes	no
Home therapy card	yes	no
Cotrim tabs	yes	no

Assessing Pneumonia Signs and Symptoms:

6. In a one month old child with a cough, for what signs or symptoms would you ask or look for? (more than one answer; answers will not be prompted)

6.1	Stopped feeding well	[ ]*
6.2	Convulsions	[ ]*
6.3	Abnormally sleepy or difficult to wake	[ ]*
6.4	Stridor in calm child	[ ]*
6.5	Wheezing	[ ]*
6.6	Fever/low body temperature	[ ]*
6.7	Severe Chest indrawing	[ ]*
6.8	Fast breathing	[ ]*
6.9	Severe Malnutrition	[ ]
6.10	Difficult breathing	[ ]
6.11	Not able to drink	[ ]

4 or more correct answers? Yes [ ] No [ ]

7. What is fast breathing in a child 0-2 months of age?

7.1	60 or more	[ ]*
7.2	50 or more	[ ]
7.3	40 or more	[ ]
7.4	Other (specify)	[ ]

Correct? Yes [ ] No [ ]

8. What is fast breathing in a child 2-12 months of age

8.1	60 or more	[ ]
8.2	50 or more	[ ]*
8.3	40 or more	[ ]
8.4	Other (specify)	[ ]

9. What is fast breathing in a child 12-60 months of age

9.1	60 or more	[ ]
9.2	50 or more	[ ]
9.3	40 or more	[ ]*
9.4	Other (specify)	[ ]

10. What do you usually use when you count the respiratory rate?

10.1	Sounding timer	[ ]*
10.2	Individual watch	[ ]*

10.3 Sand timer [ ]*
10.4 Wall clock [ ]*
10.5 No timing device [ ]
10.6 Other (specify) [ ]

One or more correct answer (s)? Yes [ ] No [ ]

11. In a one year old child with pneumonia, where on the chest and when during the child's breathing would you look for chest indrawing?

11.1 In the lower chest wall, when the child breaths IN [ ]*
11.2 Other (specify) [ ]

Correct? Yes [ ] No [ ]

Classifying Pneumonia Signs and Symptoms:

12. How would you classify this 14 month old child? He has been coughing for 3 days with a fever. He has a breathing rate of 56 per minute, and lower chest indrawing. He has no other symptoms or signs (only one answer)

12.1 Very severe pneumonia [ ]
12.2 Severe pneumonia [ ]*
12.3 Pneumonia [ ]
12.4 No pneumonia, cough or cold [ ]
12.5 Other (specify) [ ]

Correct? Yes [ ] No [ ]

13. How would you classify this 3 week old child. She is coughing but feeding well, without fever or convulsions. There is no chest indrawing, and no unusual breathing sounds. The respiratory rate is 48 per minute. She has no other signs or symptoms (only one answer).

13.1 Very severe pneumonia [ ]
13.2 Severe pneumonia [ ]
13.3 Pneumonia [ ]
13.4 No pneumonia, cough or cold [ ]*
13.5 Other (specify) [ ]

Correct? Yes [ ] No [ ]

Managing Children with Pneumonia:

14. For a child diagnosed with pneumonia, how many days do you treat with antibiotics?

15. What is the dose of cotrim for children 2-12mos?
for children 12-60mos?

16. Which children do you refer to the HP
    child less than 2 months of age
    child with chest retractions
    child who has not gotten better on antibiotics
    other

17. On what day of antibiotic therapy do you tell a mother to return with her child for follow-up
    never
    day 1
    day 2
    day 3
    day 4
    day 5

Counseling Caretakers of Children with Pneumonia:

17. What advice on home care would you give to the mother of a 6 week old child with a cough or cold, but no pneumonia? (more than one answer)

17.1	Keep infant warm	[ ]*
17.2	Breastfeed frequently	[ ]*
17.3	Clear nose if interferes with feeding	[ ]*
17.4	Return quickly if breathing becomes difficult	[ ]*
17.5	Return quickly if breathing becomes a faster	[ ]*
17.6	Return quickly if feeding becomes a problem	[ ]*
17.7	Return quickly if child becomes sicker	[ ]*
17.8	Other (specify)	[ ]

Four or more correct? Yes [ ] No [ ]

Service Activities:

18. How many pneumonia cases have you diagnosed?

	treated?		referred?	
	"severe"	"not severe"	"severe"	"not severe"
age 0-2 mos				
age 2-12mos				
age 12-60 mos				

19. Number of patients who showed up at HP after being referred by this CHV_____ Balance:_____

Facility Capacity for Case Management:

20. What are the main difficulties or constraints that you have when you manage children with cough or difficult breathing?

20.1	Case load too large	[ ]
20.2	Too little time to count breaths or do other assessment tasks	[ ]
20.3	No timing device available	[ ]
20.4	Antibiotics not available	[ ]
20.5	Need training	[ ]
20.6	Mothers demand drugs	[ ]
20.7	Referral facilities not adequate	[ ]
20.8	Poor transportation to referral facility, need to treat at home	[ ]
20.9	Other (specify)	[ ]

21. Do you advise caretakers to use traditional medicines? Yes [ ] No [ ]
20.1 If yes, what?

22. If your own child had pneumonia, would you use traditional medicines?
21.1 If so, what?

Stock:

23. Cotrim:

Received: Dispensed: Balanced

Perception:

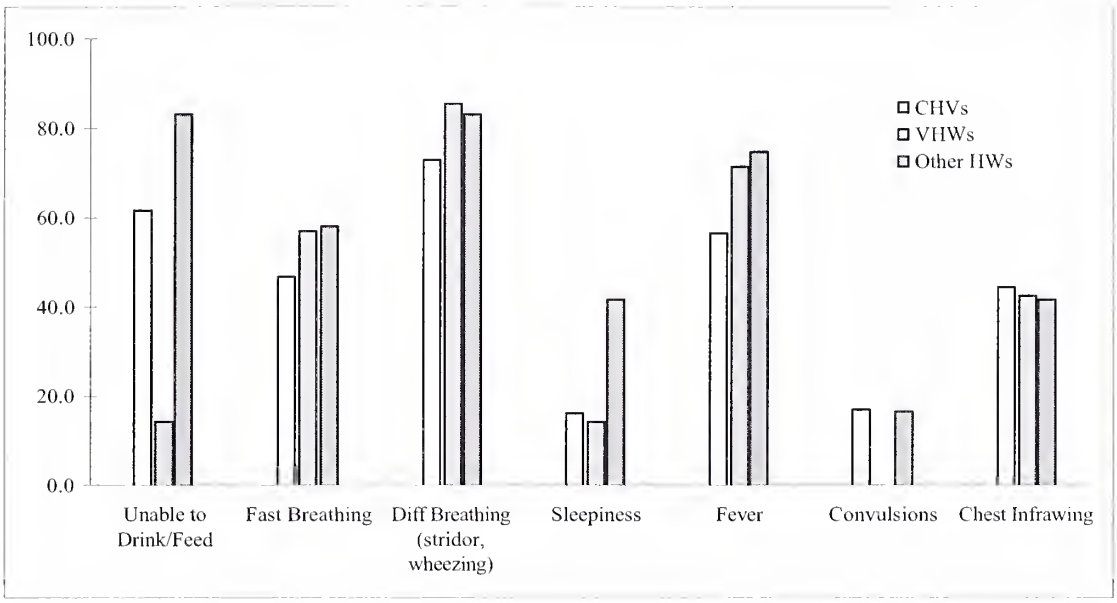
24. Do you feel comfortable diagnosing and treating children with pneumonia?

25. How could SCUS improve the pneumonia program?

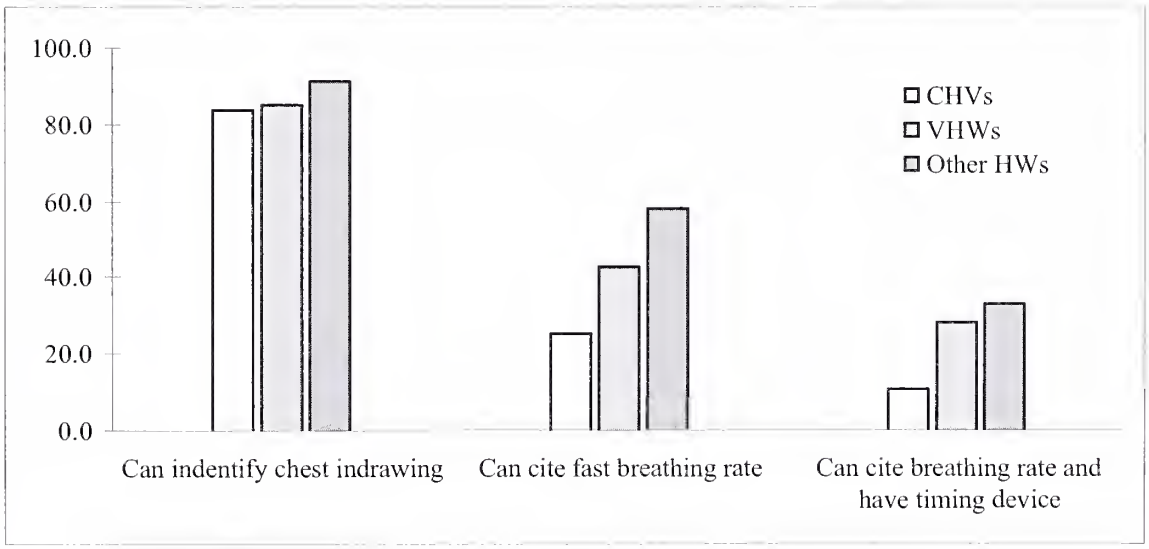
26. Would you like to continue with this role?

Comments:

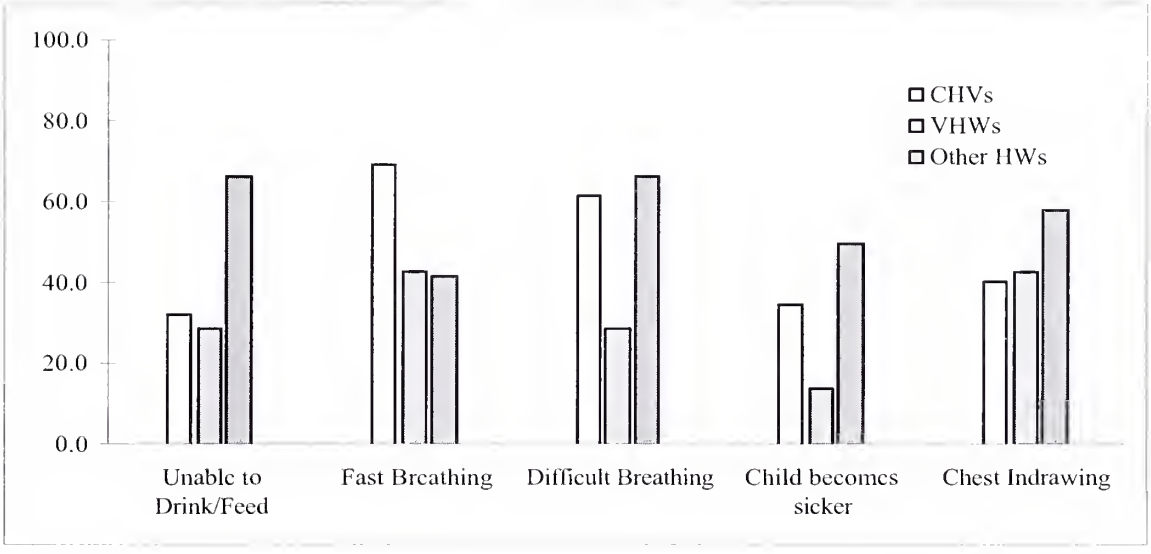
Chart A: Health Worker Knowledge of PneumonaSigns/Symptoms



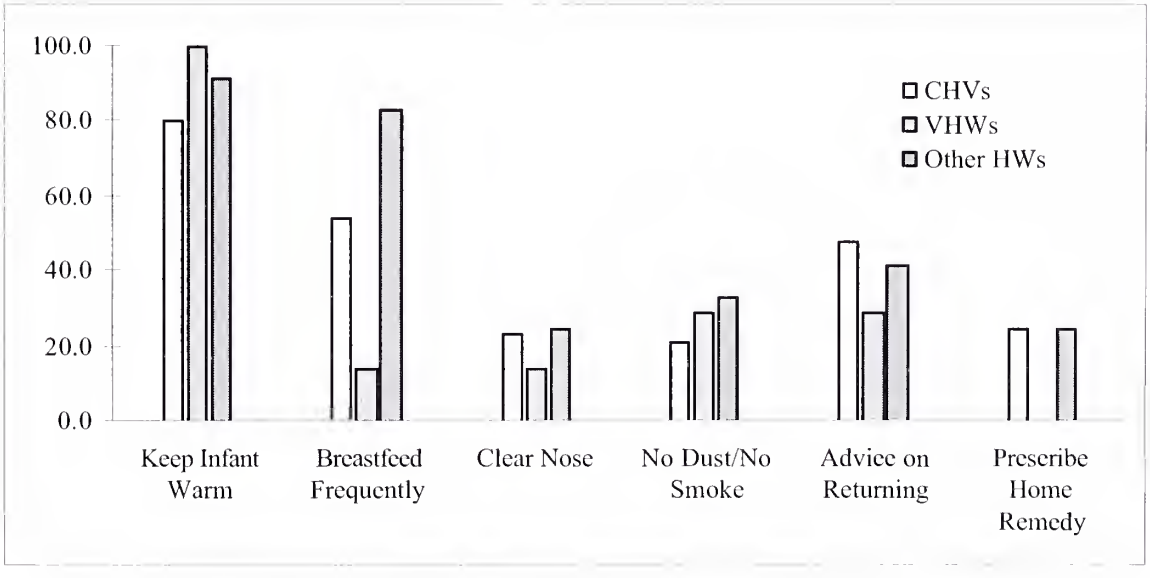
Graph B: Health Worker Ability to Assess Key Diagnostic Signs



Graph C: Health Worker Knowledge of Signs Necessitating Referral



Graph D: Health Worker Knowledge of Home Care Advice



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